JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Immediate Work for the Gas Publicity Committee.

THERE is abundant work awaiting the Gas Publicity Committee when they begin operations. They have a mandate to do so from the gas industry; but for the time being they occupy the undignified *rôle* of muzzled watchdogs, through the apathy and inappreciation of a number of undertakings. There is a desire that the Committee shall set to work with the strongest possible backing, and that every undertaking shall contribute its share to the funds, in order to make the support, as well as the work, universal through the kingdom. We appeal, and with strong reason, to those undertakings that have not joined in the movement to do so without delay. During the past week, quite a fresh crop of misconception and misrepresentation has been freely circulated among the public which should be dealt with, in a direct and prompt manner, by the Committee. There is the Kendal matter, which is specially referred to in another article; and, in connection with the Coronation illuminations, there are the numerous newspaper references to the cost of electricity in comparison with gas. These newspaper allusions as to cost have obviously been inspired from a common quarter, as they run much on the same lines, and bear a striking family resemblance. In them there has been a deliberate ignoring of the fact that, in such illuminations, electricity only comes up against the open gas-jet and the voracious flambeaux, and not, as in ordinary lighting, up against the greater economies of incandescent gas lighting. The published comparisons, too, have been made with the metallic filament lamp; while, for the most part, owing to their comparative cheapness, the illuminations were carried out by the aid of carbon filament lamps, which consume three or four times more current than metallic filament lamps. The further point, too, has been kept hidden as much as possible, that the cost of installing electric illuminations was something immense, owing to the considerable care that had to be taken to avoid fire and other catastrophe, and to the expense of the bulbs used. Work lies there that should be dealt with expeditiously by the Gas Publicity Committee, notwithstanding that their operations have not formally commenced.

There is, however, a still more serious matter that should not pass unnoticed, though the Committee have not yet settled preliminaries through (we want to keep this well in mind) not having at the moment secured the attachment to the movement of the whole of the gas undertakings in the kingdom. The "Sunday Times" has an extensive circulation among all sorts and conditions of people throughout the country; and that paper last Sunday devoted its editorial columns to a retrospect suggested by the Coronation. Our attention has been called to this retrospect from correspondents in London and nearly a hundred miles distant. This is what our Sunday contemporary says concerning gas lighting:

> When we turn to the arrangements made for the artificial lighting of London, we find a not less degree of improvement. The old method of lighting London by torches was passing in 1807, when Pall Mall was lit with gas for the first time. It was only five years before the Coronation of Queen Victoria that the Vauxhall Gas Company was installed, by which the greater part of London then became lighted. *Now we are witnessing the almost universal substitution of the healthier and cleaner mode of electric lighting for the fume-laden and deleterious illumination of gas.* And, though it may be but a coincidence, it is interesting to recall that Pall Mall was the first London street to be lighted by electricity in 1882, as previously it was the first to be lighted by gas.

There is evidence here that the Gas Publicity Committee have a little educational work to do among those who sit in the editorial chairs of the public Press, and wield their influence in the shaping of public opinion. The Editor of the "Sunday Times" cannot have kept his knowledge concerning gas matters in line with the times, as otherwise he would have known that, far from suffering an almost universal extinction, the gas industry's business has doubled itself in the past twenty years, and shows progress year by year. He would also have known that Pall Mall has forsaken electricity, and has returned to gas for its illumination; and he would further have been aware that the "fume-"laden and deleterious illumination of gas" is one of the fictions bred by an old school of fanatics, and vindictively kept alive by a certain section of electrical competitors who find progress in domestic business very hard to achieve in face of the advances in economy and efficiency of incandescent gas lighting and gas heating. Such sayings are very much shop-soiled to-day; and it is a matter for wonder that the Editor of the "Sunday Times" has not recognized the old stock phrase. Perhaps, however, he believes in it. If so, we shall be glad of his interpretation of it, so as to ascertain the real nature of his belief, and be in a position to aid his better understanding.

Ignorance has a way of taking a good deal of liberty; and it is a grave pity that the liberty that ignorance is taking with the character of gas should receive even the semblance of sanction by silence. Therefore we call attention to a further circular that is being issued to all gas undertakings that have not yet subscribed to the Gas Publicity Committee, and which circular we hope will hasten the preliminaries of this movement to a conclusion, so that the Committee may take steps at once to engage in solid work. It will be remembered, as a result of the London conference, that the Committee promised to reconsider the question of the amount of subscription. They have done so; and, after most careful discussion, they have concluded—and we consider rightly concluded—that, in order to make the scheme successful, it is necessary it should not be launched on a lower subscription basis than 2s. 6d. per million cubic feet of gas made per annum. This conclusion was concurred in by the Salford Conference, in which chairmen and officers of both municipal and company undertakings took part. The wide scope of the work of the Committee is put in a nutshell when it is said that "the scheme is primarily a campaign in "favour of gas—not merely as an illuminant, but as a fuel, "both domestic and industrial, and as a motive power." The Committee appeal with renewed confidence to the industry as a whole to provide the funds essential to the successful prosecution of its work. With adequate support, the value of the scheme will soon be demonstrated in, we believe, a way that will ensure the continuance of the support. The boards of directors and committees of the gas undertakings of the industry are the custodians of large financial interests. Through the work of the Publicity Committee, the protection of those interests will, we trust, soon be greatly strengthened.

Notes on the Institution Papers.

THERE was a promise in last week's "JOURNAL" that a few comments should be made in the present issue on the papers that were read (other than those on carbonization) at the meeting of the Institution in Glasgow. But when we come to look into the communications again in conjunction with the notes upon them in the "Review of the Proceedings," there appears to be really little more that need be said. There is not among the papers a single one to which value does not attach, and there are more than one in which there is novelty. If we take the paper read by Mr. E. W. Smith, on "High-Pressure Gas for Industrial Purposes," there is value in it, because this is a field in which the high-pressure gas business is only at the inceptive stage of its development. It is all very well for Mr. George Helps to say that Birmingham may take the credit, while Nuneaton is getting the results. But Nuneaton has not work in its midst so diverse in character, in which heat is required, as the great Midland city. That is what Mr. Smith means by using the words: "The whole

"subject is new, and the foundation has still to be built." There are really yet comparatively few industrial processes in this country to which high-pressure gas heating has been applied; and it is found in Birmingham that the character of process may mean in some respect, in order to obtain the best efficiency, some difference in the mode of application. To ascertain these differences, and to develop the best method under every circumstance, are parts of the work that Mr. Smith is in Birmingham to deal with. It would not be the slightest use for the Gas Department to lay high-pressure mains through the city, and then to put up a card in their show-room windows announcing "High-Pressure Gas for "Sale." That would bring them very little custom. Few if any of the manufacturers of Birmingham know anything at all about high-pressure gas and its potentialities. They have to be taught, and that practically. They have been accustomed in their own times, as were their predecessors in theirs, to solid fuel; and if they are to be induced to make such a revolutionary change as a departure from solid fuel heating to gaseous, then they have to be shown how to apply it, and that efficiently. The department, in doing this, will even go the length of developing at their laboratories a mode of working for some particular purpose, and there demonstrate it to the manufacturer, before he determines upon adoption. This is spade work; and we are with the President, Mr. J. Ferguson Bell, and others that a very large amount of credit is due to the Birmingham Corporation Gas Department for what they are doing in this respect. The paper is an informative one; describing as it does paths previously untrodden that are now being paced at a remarkably good speed.

There is next the paper by Mr. S. B. Langlands, on "Public "Lighting," in which he refers to Glasgow in particular. The thing that strikes us chiefly about the paper is that, though Glasgow has made great improvements in its public lighting, and though the work of the department has been largely systematized since Mr. Langlands has had charge of it, he has a big scope for greater economy there, unless the experience in other places has no application to Glasgow conditions. We see no reason whatever why it should not apply. That experience tells us there is economy of gas and mantles by using the inverted burner. Mr. Langlands himself admits that he gets photometrically 3 candles more per cubic foot of gas with the inverted burner than with the upright one. If we take only that difference, and suppose the use of 3-feet burners, it means 9 candles more per burner, which, on the 16,740 incandescent lamps in the city (without reckoning the thousands upon thousands of lamps in private streets and courts, in the closes, and on the common stairs), would represent no less than 150,660 additional candle power distributed through the streets of Glasgow. Then, as he believes in tip-top maintenance, Mr. Langlands with his upright burners uses 9·16 mantles per lamp per annum. That is regarded as high, not to say extravagant, down south; and the inverted method of suspending the mantles in street lamps is found to effect still greater economy, in view of the absence of the deterioration that occurs through the swaying skirt of the upright mantle.

We now turn to Mr. C. F. Broadhead's paper. It is one of many points—too many for the purpose of a few-lined comment. Its chief value consists in the encouragement it should offer to boards of directors, committees, and engineers to take a bold course when in charge of an undertaking that seems to be hopelessly involved in muddle. Unconsciously, Mr. Broadhead gave himself a high testimonial, while his object was to afford an apt illustration of the effects of modernization and diplomatic management upon the fortunes of an undertaking generally and the service it renders to the consumers. In this he succeeded.

Coming to the suggestive paper by Mr. James M'Leod, of Greenock, entitled the "Corrosion of Service-Pipes," we hope that it will have further investigation, so as to ascertain whether the more rapid corrosion of service-pipes now than aforetime is an effect of higher carbonization heats and the discontinuance of lime purification and the use of oxide only—through the gas now containing a larger quantity of impurities, and a lessened amount of hydrocarbons that formerly served to deposit a coating on the interior of the pipes. Seeing how largely the very impurities of which Mr. M'Leod speaks are reduced in vertical retort working, it would be of interest to ascertain his views as to whether the gas from vertical retorts would not largely neutralize his argument. There is another point. Does he find this corrosion goes on at a faster pace now in the old service-pipes than before, or is his comparison between pipes of comparatively recent date and pipes of old age? The reason for asking this question is that we remember hearing Mr. W. Doig Gibb, the Chief Engineer of the South Metropolitan Gas Company, in a little informal discussion, speaking of the deterioration in the quality of wrought and cast iron pipes as compared with pipes made at a period somewhat remote from the present. He believes that the quality of iron now available is not what it used to be; and that the almost universal use of mild steel, instead of the old real wrought iron has much to do with the shorter life of more recent material. Yet pipe-founders have sought technical assistance in the production of mixtures for the very purpose of producing pipes of good strength and resisting power.

The paper by Mr. Bernard F. Browne is again valuable and novel. Some of the hints culled from his strenuous experience in the City of Buenos Ayres will be useful at home. The paper shows a large resourcefulness which, in whatever sphere Mr. Browne may be placed, will serve his undertaking well. But, apart from the personal aspect, it is seen how, under a plurality of hostile circumstances, a gas undertaking can be made to pay, and pay well—if only properly managed.

A Few Words with the Kendal Health Committee.

If the Kendal Corporation do not administer a severe rebuke to their Health Committee for their mistaken and absurd excess of zeal, and compel the withdrawal at once of a circular that must appear to any intelligent outsider to have for one of its aims (if it means anything at all) the ruining of the Corporation gas undertaking, the Corporation will deserve the censure of the whole of the ratepayers of the borough, and of the gas industry generally. The Corporation have, in their gas property, a concern with an outstanding capital of, we should say, approximately £64,000, and an annual make of gas round about 90 million cubic feet; so that it is a property that is worth keeping and defending. But what are the Health Committee doing? They are circularizing people, telling them that "when gas is lit "it takes some of the best part out of the air, and gives out "a great deal of poison." It says other things, too, to which reference will be made presently, and ends the principal objectionable paragraph with the remark: "An elec- "tric light is best of all, as it gives a strong light without "spoiling the air at all." Now if the Gas Department had been a gas undertaking run by a Company, that Company would have been perfectly justified in taking proceedings against the Corporation to restrain them from publishing—we will not say in this instance maliciously, but senselessly, thoughtlessly, and ignorantly—a statement that is untrue, and that was calculated to do them an irreparable injury in their business among the people of an area in which the Legislature had conferred upon the concern legal powers to trade in gas of prescribed quality. It is to be hoped that before long a case will be found in which a gas company can prove having suffered material damage through the circulation—by an electricity undertaking, the Electricity Publicity Committee, the Electrical Press, or others—of unfounded statements concerning the use of gas.

The paragraphs in the circular (which bears the coat of arms and the words "Borough of Kendal" beneath) of which we make complaint read as follows:

> When gas is lit, it takes some of the best part out of the air, and gives out a good deal of poison. The air of a good-sized room, with window and door shut, is unfit to breathe after a single gas-jet has been burning in it for one hour. The smaller the room, or the more gas-jets in use, the sooner the air becomes unfit to breathe. An incandescent gas-burner gives a much better light than a common gas-burner, and takes rather longer to spoil the air. A lamp or candle takes still longer to do the same harm, but gives far less light. An electric light is best of all, as it gives a strong light without spoiling the air at all.
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> When gas is being used for lighting, or a stove for heating, or gas for cooking, the poisons produced should be carried out of the room at once, and plenty of fresh air should be admitted to take the place of what is being spoilt. Stoves should not be used without proper flues. Gas cookers should have a hood and separate flue for the upper burners, as well as a flue for those below.

We are quite prepared to fully discuss the whole of the objectionable and slanderous items of these paragraphs with the Health Committee of the Kendal Corporation, or the Chairman. There is deliberate mention of the Chairman, because it happens to be within our knowledge that he is a medical man. We want, however, to first get on to a proper footing; and so we will ask the Health Committee

or Dr. Parker to put into figures and names (in relation to the combustion of gas) the precise meaning of the words "a great deal of poison." It is seen in the second quoted paragraph that the plural term "poisons" is employed; so that this denotes that there are several produced by the burning of purified gas. We take it that there are people still living in Kendal who have used gas for a considerable number of years. If there is any truth or sense in what the Health Committee say about gas, then surely those people ought not to be alive to-day.

The medical profession, it seems to us, should to-day more than ever to be silent over this popular, and yet terrible "poison" producing, illuminating and heating agent, seeing that they are keenly resenting the harm they are expecting to suffer through the Chancellor of the Exchequer's scheme of national insurance against sickness. In the United Kingdom there are about 6¼ millions of people supplied with gas by the statutory gas undertakings alone, to say nothing of the consumers served by the hundreds of non-statutory gas companies that are, and have been for decades, operating in these isles. And these 6¼ million gas consumers only represent a part of the population that live and flourish in the houses in which the gas purchased is used. Gas "gives "out a great deal of poison!" Then what a big field the doctors have, without worrying over Mr. Lloyd George's insurance scheme, for exercising their practice if they will only keep quiet about the poisonous effects of the use of gas; for a goodly proportion of the number of gas consumers will not come within the scheme, and so will continue their relations, and more intimate relations if the Kendal Health Committee are right, with their medical men. Without going further at the present time, we ask the Health Committee of the Corporation, or their Chairman, to come out into the open, and have a little amicable discussion over this matter, just to test the strength of the foundation upon which the objectionable paragraphs referred to are based. The first thing is the definite information as to volumes and character of poisons for which we have asked.

Some of the Evils of Publicity.

We think the foregoing information from Kendal will supply Mr. Norton H. Humphrys with at least one good reason for a strong and well-financed Publicity Committee to carry on educational and advertising work among the gas consumers of this country. Mr. Humphrys has contributed an article to our columns on the question of publicity; and, after trying to construct from what he has written, and from what we gather from reading between the lines, the reasons that induced him to pen the article, we can only arrive at the conclusion that he does not think much of the proposal, nor can he see much necessity for it. We take it that our contributor writes entirely from personal experience. If this is so, the last paragraph but one of his article furnishes a very good reason for the existence of an active Publicity Committee. Mr. Humphrys' experience leads him to say that, in the case of an electricity company, "the whole body "from the chairman down to the messenger boy are imbued "with the necessity for pushing their commodity at all times "and seasons." But what is the awful condition of things with a gas company. There is not "as a rule, any personal "enthusiasm among the directors and the staff" in securing the interest and co-operation of influential people; nor have "the majority on a gas-works staff ever drummed-up a new "customer since the time they joined the company." If that is the sort of lethargy that exists in any gas company, then the sooner, for the future welfare of that company, there is a wholesale change of staff, the better.

To the main subject, however. Directors and committeemen well know, without the fact being emphasized, that the publicity movement has not had its birth in any decrease of the sale of gas; and we take it that, by looking round at the conditions under which the gas industry is prosecuting its business to-day, at the rapid progress it has achieved in developing appliances, at other matters associated with those appliances, and at the necessity for doing more than in the past in insuring and protecting a business with a greatly increased value, most gas directors and committeemen will be able to intelligently appreciate all the reasons for an active joint publicity campaign. We do not think that advertising and educational work in the general commercial world are regarded by the public as any sign that the advertisers are in a bad way; nor do we think that the public will do so in the case of gas. They will regard it as evidence of life and push. Furthermore, there are not many gas managers in this country who would plead as an excuse for not taking part in the publicity movement that their time is now fully occupied, and that they have little opportunity as it is for extensions and so forth; and there are few who would look with any disfavour upon a good substantial increase in business as the result of the propaganda work of the Publicity Committee. Twenty years ago, the Tottenham and Edmonton Gas Company had a larger business than the Salisbury Company have to-day. The Tottenham business then—that was in the year ending December, 1889—was represented by 267,450,000 cubic feet; while in the year ending December, 1909, the consumption of gas was 1,483,174,000 cubic feet. Engineer, staff, works, methods have all kept pace with this luxuriant growth; and —it may be very stupid from the point of view of some people, but not from ours—the Board, Engineer, Secretary, and staff generally are all anxious for further development. The Board, in fact, were the very first to offer contribution to a publicity movement at the rate of 2s. 6d. per million cubic feet of gas sold. Nor do we think that the expansion of business and the requirement of fresh capital can have any other possible effect than it has always had in the gas industry—that is, to appreciate the market values of capital stocks, and not to depreciate them. It is the "stick-in-the-"mud" undertakings that are likely to suffer depreciation of values, and not those go-ahead ones who believe in the spending of money in the cause of propaganda and business development. We do not think Mr. Humphrys has done himself full justice in this article. It seems absurd to have to think of him as anything but a progressive of the very first water.

Or Other Approved Burner.

There are numbers of gas undertakings in the country with Acts containing gas-testing clauses which make provision not only for the use of the test-burner prescribed as the standard, but also for the substitution of that burner by any other that (the necessary formalities having been complied with) may appear to the Board of Trade equally, or more, suitable for testing. It would be of interest to know how many concerns have availed themselves of this condition (which stands permanently in the Model Clauses for Gas Bills) since the "Metropolitan" No. 2 burner met with the approval of Parliament and of the Board of Trade. It is patent that the Board have anticipated that gas undertakings who were fortunate enough to possess the provision would avail themselves of the opportunity of obtaining the right to use a burner that is generally acknowledged to be a more scientific instrument, and to do greater justice to all ordinary qualities of gas than did any of its predecessors, seeing that they have ready for use printed papers of instructions as to how to proceed in the matter of effecting the change.

In last week's "Journal," a paragraph recorded that, while the Chief Engineer of the Newcastle-upon-Tyne Gas Company (Mr. T. Hardie) was at the Institution meeting, he received information from the Secretary (Mr. Thomas Waddom) that the Board of Trade had granted an unconditional approval to the use by the Company of the "Metro-"politan" No. 2 burner. Considering the important position occupied by the Company, this item of news is more than ordinarily interesting; and it should certainly serve as an incentive to other undertakings to go and do likewise. The change was effected—as it is obvious Parliament intended that it should be effected—in a simple, expeditious, and inexpensive manner. The Company are one of those whose Act provides for the supersession of the old burner by a new one, by obtaining the approval of the Board of Trade, and the power has served them well at this particular time. The procedure is very plain sailing, when, as in the case of the Newcastle Gas Company, the local authorities recognize that there is so much precedent now for the setting up of the "Metropolitan" No. 2 burner, and so much approval of it by Parliament and the Board of Trade, that it would be the height of stupidity to oppose the change. Local authorities ought now to know, if they are properly advised, that there is no argument hostile to the new burner that the wit of man can devise that Parliament and the Board of Trade have not heard—always with the same effect, that the burner has been allowed. They ought also to know, if properly advised, that there has been a senseless waste of public money in that quixotic game of having a tilt at the inevitable.

The Newcastle Company merely made the necessary

application to the Board of Trade, gave notice to the local authorities (there are several of them) within their area of supply, and inserted the necessary advertisements in the local papers. The Newcastle Corporation made some inquiries, which were either satisfactory, or which convinced them that it was no use throwing away good money, as many other local authorities have done, in a wild-goose chase. All the other authorities exhibited an utter indifference to the proposal, which clearly shows their wisdom. There is nothing more to say, excepting that the time for opposition expired; and the middle of this month placed the Company in the possession of the sanction of the Board. A pound or two will cover the total expenditure made by the Company. Therefore, on all points they are to be congratulated; and their success should be an inducement to other gas undertakings, whose Acts embrace the provision as to change of burner with the approval of the Board, to follow their example. It is a pity to have the power, and allow it in these times to lie dormant.

Factories and Carbon Dioxide.

Although the Inspectors under the Factories and Workshops Acts have not abated one jot their campaign against flueless gas-stoves, we are pleased to recognize, from the recently issued report of the Chief Inspector, that they have adopted a more temperate and a less irritating tone than has been all too manifest in immediately preceding reports—a tone that has not done anything to induce closer sympathy between the suppliers of gas and of gas appliances and the work of the Inspectors. There is acknowledgment in the present report that gas radiators are "a clean, convenient, and inexpensive" means of heating; and all the evidence in the reports of the Divisional Inspectors points to their sole objection being the increased amount of carbon dioxide that is found in the atmosphere of improperly ventilated rooms where flueless radiators are used. But as Dr. Toogood has said, in connection with his experiments at the Lewisham Infirmary, if a room of any kind is not ventilated in a manner to allow the employment of a flueless radiator in it, then, *a fortiori*, that room is not fit for human habitation—especially a room in which operatives are busy from morning to night. The cleanliness, convenience, and inexpensiveness of this form of heating ought not to be denied to factory owners and their employees when its use is permissible, providing the other conditions—and they are simple ones—are right.

We have searched through and through the present report of the Chief Inspector, and of the Divisional Inspectors, in vain for any evidence that points to any deterioration of the health of employees that can be definitely assigned to the use of the flueless radiator. But we do find the evidence of a considerable popularity, which popularity is the increasing product of experience, and which serves to belittle the opinions of Inspectors that refuse to expand beyond the prescribed 12 parts of carbon dioxide in 10,000 parts of air, without any reference whatever to the character of that carbon dioxide. It is regrettable that Acts of Parliament should be used for such absurdly close restriction, that they should allow no little latitude for intelligent and scientific discrimination, and that they should cause ideas and judgment to be stunted by the infliction of a too narrow rule. One of the Inspectors points out that the rule as to 12 parts of carbon dioxide in 10,000 parts of air, entails considerable difficulty in securing an adequate temperature while not interfering with the purity of the atmosphere. That is not at all surprising where a number of workpeople are engaged. Searching the report with scrupulous care, the very worst cases of excess of carbon dioxide where flueless radiators are installed show 39·5, 37·1, and 34·4 parts in 10,000 of air; and therefore it may be presumed (as these are quoted as bad examples), seeing the hundreds of thousands of flueless gas-stoves that there are in use in the country, and their number is constantly increasing, that it is found as a general rule that the proportion of carbon dioxide in 10,000 parts of air is considerably below the cited figures. There is a table at the end of the report classifying the accidents from fumes and gases; and to a note accompanying the table the very particular attention of the Inspectors should be invited. It points out that classification should take some account of the relative toxicity of the compounds. That is what we claim in connection with the consideration of the question of the use of flueless gas-radiators. In other words, the Inspectors should be allowed to have regard to the difference between the carbon dioxide and its noxious organic accompaniment due to human exhalations, and the true carbon dioxide from the flueless gas radiator. If this could be, then we should quickly find a more effective attack on ventilation, and a lessening of the insensate attack on flueless radiators.

As we said some time ago would be the case, without making any distinction of any kind, without making any distinction between the flueless gas radiator and other forms of gas-heating appliances, the competitors of the gas industry, especially the Electricity Publicity Committee, have made full use, and flagrantly unjust use, of the information given in this annual report when prosecuting their commercial ends among the uninitiated in this matter. If, however, they study the present report, with an eye to just representation, they will find that, where there is proper ventilation, or where flues are attached, or where other forms of gas-heating appliances are employed, the volume of carbon dioxide in 10,000 parts of air comes well within the stringent rule laid down by the Act—a rule that entirely ignores consideration of the harmless as opposed to the harmful. Take the quoted bad case in which 39·5 parts of carbon dioxide in 10,000 were found, the replacing of the flueless stove by one with a flue resulted in "a "sample of air, taken under almost similar conditions," showing only "8·7 parts of carbon dioxide in 10,000 "parts of air." Does not this contain a lesson for the competitors of the gas industry? What have they to say, too, to the statement of the Inspector for the Dublin division "that electric radiators, where tried, have not, I think, "been found to be very satisfactory." However, without admitting that there is any ground for attack upon flueless radiators where the ventilation is as it should be for ordinary sanitary conditions, the whole report points conclusively to the fact that gas heating for warmth or for carrying on the work of the factory can be conducted by comparatively inexpensive attachments, not subject to any appreciable deterioration, and not requiring any mechanical means of ventilation—such as an electric fan—while still observing the stringent rule. It is also remarked that coke stoves are becoming more largely employed; and further that attempts are being made to devise gas-stoves, suitable for use in factories and workshops, that will avoid the objections of the Inspectors to flueless radiators.

The growth of the use of producer and suction gas, with its large percentage of carbon monoxide, continues, as frequent reference in the report shows, to be the cause of notable gassing and poisoning. Of 53 cases of accident in this respect, nine were fatal; but of these nine, seven were due to blast-furnace gas. It is only fair to say that of 25 carbon monoxide accidents due to producer and suction gas, not one was fatal. But we do think that such gases ought not to be, as appears to be the case, introduced into such places as laundries, for ironing operations. There cannot be a great, if any, economy for such purposes over ordinary town gas where prices are reasonable. And that the work can be conducted with town gas in a perfectly unobjectionable manner is proved by the statement of Miss Paterson, that "in a laundry attached to "a large hospital in London, the work has been excellently "done, and the air is completely free from gas." What can be accomplished in that hospital can be as perfectly done elsewhere.

Manufacturing and Sales Results at Manchester.

This week there are published over the signature of Alderman Robert Gibson, the report and accounts of the Manchester Corporation Gas Department. Financially and commercially, the tale is good. Increased revenue and increased business are shown all round. It is, however, on the technical side that greatest interest is at the moment found; inasmuch as though 5436 tons less coal were carbonized during the year, and 143,361,000 cubic feet less carburetted water gas were made, the department sent out 98,156,000 cubic feet more gas than the previous year. These figures are an indication of good carbonizing work—work that in results passes previous Manchester records. The make of gas was 11,349 cubic feet per ton, or 315 cubic feet more per ton than the previous year. But it must be remembered that this is gas of 17·2-candle power, tested by the "Metropolitan" No. 2 burner. Supposing all the gas required had been made in Glover-West retorts, such as are in use at the Droylsden station, what a further big difference there would have been in the working and

financial results! The Chief Engineer (Mr. J. G. Newbigging), in his paper before the Institution of Gas Engineers the other day, showed that, from Lancashire and Yorkshire coal, he could, with continuous carbonization in vertical retorts, make per ton of coal about 12,000 cubic feet of gas of about the illuminating quality named—that is to say, between 600 and 700 cubic feet more per ton. This increase, multiplied by about ½-million tons of coal, would represent a considerable volume of gas. Another particularly interesting feature of the report and accounts has reference to the period of the day that is the most prolific in the development of consumption. The increased consumption for the year was 98,156,000 cubic feet, representing 1·76 per cent.; while the increase in the daylight consumption was 63,166,000 cubic feet, or 3·43 per cent. As a matter of fact, the daylight consumption during the year has now reached 1,905,269,000 cubic feet out of the total consumption of 5,663,570,000 cubic feet. From the prosperity of the concern, the users of gas for manufacturing purposes are to receive, from next June, gas at 2s. instead of 2s. 3d. per 1000 cubic feet, while the city prepayment consumers are going to have the amount of gas provided for 1d. advanced from 30 to 33 cubic feet from Sept. 30—those outside the city obtaining an increase from 25 to 28 cubic feet. This is all highly satisfactory. And more so would it be, if the Corporation would do the right thing by renouncing all profit-appropriation in relief of the general rates, and devoting the money to the still cheaper gas service of the community.

Rates and Rateable Value.

In the course of a paper read at the annual meeting of the Institute of Municipal Treasurers and Accountants, Mr. G. R. Butterworth, Borough Accountant of Hastings, remarked that it was obvious there must be a limit to the taxability of property; and he added that, in view of the difficulty which would be experienced in broadening the basis of local taxation to any appreciable extent, it would appear that, if local rates were to be kept down, further relief in the shape of Imperial subventions must be obtained in respect of the expenditure by local authorities on services of a national character. The paper dealt with the "Relationship between Rates, Local Debt, and Rateable Value;" and the author included in it some significant figures. The increase in rateable value during the nine years ended March, 1908, was, he said, as follows: 1907-8, £200,930,797; 1898-9, £163,605,407; increase, £37,325,390. The particular point brought out by these figures was the fact that, notwithstanding an increase in rateable value of 22·81 per cent., the rate in the pound had increased by 24·78 per cent. In other words, if the rateable value had remained the same, instead of the rate in the pound showing an increase of 1s. 2·35d., or 24·78 per cent., the increase in nine years would have been 2s. 6·54d., or 52·74 per cent. Full data on the above lines were not available for the two years ended March, 1910; but the tendency might be gauged, so far as the county boroughs were concerned, from the annual statement prepared by the Borough Accountant of South Shields. From this, he found that, while the average rate levied in 66 county boroughs was 7s. 7½d. in the pound for the year 1907-8, in 1909-10 the corresponding figure was 7s. 10d. The rateable value had during the same period risen from £47,440,327 to £48,830,113—an increase of £1,389,786. Rateable value being based on rent or profits, it naturally followed that if rent and profits were decreased, rateable value was also reduced. High rates tended to reduce the amount of rent or profits; and therefore the rateable value must fall. High rates, moreover, tended to increase the amount of empty property.

And Local Debt.

Proceeding to deal with the effect of local debt on the rates, Mr. Butterworth remarked that he came to the following conclusion: (1) That remunerative debt, in the main, has the effect of reducing rates, and consequently of relieving the burden of charge on property; (2) that unremunerative debt increases rates, and renders them less elastic owing to fixity of the annual charge; and (3) that when the rates are high, proposed expenditure on permanent works of an unreproductive character should be carefully considered, inasmuch as such expenditure creates financial obligations for future ratepayers. He realized there were many other matters which had a bearing on the subject. One of these was the effect of judicious enterprise and expenditure by municipalities on works of improvement which, though they might not be directly reproductive, had the effect of increasing the prosperity of an area, and of adding to the rateable value by creating a demand for property. There could be no doubt that, owing to the constantly increasing demands made by Parliament upon local authorities to incur expenditure, the burden thrown upon property had reached a point which tended to discourage desirable improvements in large centres of population. The only solution appearing to the author to be within the region of practical politics was that further grants should be made to the authorities from Imperial sources. One of the subsequent speakers expressed the opinion that it should be made more difficult for local authorities to borrow; while another urged that the case of these bodies for further relief was overwhelmingly strong, and should not be spoilt by overstating it. In reply to the remarks made, Mr. Butterworth said there could be no doubt that, in the aggregate, the effects of profits transferred from the trading concerns did actually reduce the rates in the pound.

Patent Appeals.

The need for reform in connection with appeals by patentees from decisions of the Comptroller-General of Patents to the Law Officers has been pointed out in the course of an article in "The Times;" and it is added that it is satisfactory to learn that the subject has received consideration by the Patents Section of the London Chamber of Commerce. It has been decided that public attention shall be directed to the reform movement by a resolution which is to be moved at the autumn conference (to be held at the end of August) of the Associated Chambers of Commerce. This resolution will urge that steps should be taken to improve the procedure for dealing with appeals from the Patent Office. Our contemporary says it is suggested that one means by which the hearing of appeals would be facilitated would be the creation of a body consisting of the existing and past Law Officers; while an alternative proposition put forward is that a much more efficient tribunal of appeal from the Comptroller would be to the Judge of the High Court to whom is assigned the duty of hearing petitions for revocation and appeals from the Comptroller in the cases of revocation of patents. As showing the importance and urgency of the subject, it is pointed out that during the last few years there have been many complaints by patentees of the increased and unnecessary delays frequently occurring in the hearing of appeals from decisions of the Comptroller-General to the Law Officers. The appeals in cases of opposition to the granting of patents are 80 per cent. of the whole; while an examination of the books of three Counsel shows that the average period from the hearing before the Comptroller to the appeal to the Law Officer for the years 1898 to 1905 was 118 days, and during the period since 1905 it had risen to 287 days. During the years 1900 to 1905 inclusive, the only appeals outstanding (that is, waiting to be heard by the Law Officer) when the annual reports of the Comptroller were made, were of cases heard by him during the year reported on, and were only 11·3 per cent. of those appealed from. But in the years 1908 to 1910 inclusive, the average percentage of such cases was 83, some of which were two years old. Undoubtedly, the chief cause of delay, says "The Times," is the arrangement under which the Law Officers are paid by salaries for all non-contentious business. Year by year the various Government Departments send more cases to the Law Officers for their opinion; and they have therefore less time for their patent work.

Personal.

The Buxton Urban District Council have appointed Mr. F. Shaw, of Darwen, as Engineer and Manager of their gas-works, in succession to Mr. Harold Barker, who was recently chosen as Manager and Secretary of the Llanelly Gas Company (Mr. Thomas Acland having relinquished this position owing to ill-health).

Our hearty congratulations are offered to Mr. and Mrs. J. R. Frith, of Runcorn, on the occasion of the celebration of their golden wedding last Tuesday, when there was a family gathering at his residence. Both Mr. and Mrs. Frith are natives of Stafford, and they were married at St. Mary's Church in the town on June 20, 1861. Two years later they moved to Runcorn, when Mr. Frith took up the duties of Manager of the Runcorn Gas Company, which he has retained up to the present day. He has seen the gas consumption increased to ten times the quantity sent out when he went to Runcorn, and its price reduced to about half; while the old works have been superseded by others containing all the latest improvements in the way of plant. Mr. Frith was one of the pioneers of gaseous firing. During the past week a large number of congratulatory messages were received by Mr. and Mrs. Frith.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 1020.)

Business last week on the Stock Exchange, as elsewhere in the City, was almost completely eclipsed and overborne by the great National Festival and a loyal people's enthusiastic demonstration of welcome to their King. The thoughts of all were centred on the Coronation; and upon those days when the Exchange was open, the volume of business done was much restricted, and markets might have been marking-time until the resumption of work in earnest this week. On the opening day, things began to quiet down from the start. Home Government issues were not over-strong, and Consols were slightly easier for the account. Home Rails made a good show at first, and prices rose; but later on this was checked by realizations. Americans for the most part were a little better. Tuesday was quieter, and the tone was dull for lack of support. Consols fell $\frac{1}{16}$; and other of the gilt-edged family were weaker. Railways were depressed by news from the strike centres. Wednesday morning produced a little business. Gilt-edged securities again shrank; but Rails, after a shaky opening, made some recovery. The afternoon was given up to demonstrations of loyalty; for the gentlemen of the Stock Exchange are among the most devoted of His Majesty's subjects. Opening again on Saturday, only a very meagre attendance could be counted. But prices were fair. Consols closed at $79\frac{3}{8}$-$\frac{7}{8}$, Railways were a shade firmer, and Americans rose. In the Money Market, there was a fair demand at firm rates, and discount terms were harder. Business in the Gas Market was very quiet, even allowing for the counter attractions of the week; and there was but little movement. In Gaslight and Coke issues, the ordinary was firm at prices ranging from $106\frac{1}{4}$ to $106\frac{3}{4}$. In the secured issues, the preference was done at from $103\frac{1}{2}$ to $104\frac{1}{4}$, and the debenture at $78\frac{3}{4}$ free. In South Metropolitan, there were three transactions—marked at $119\frac{3}{4}$ and 120. The debenture realized 81. In Commercials, the $3\frac{1}{2}$ per cent. changed hands at from $108\frac{1}{2}$ to $109\frac{1}{4}$; and the debenture was done at 76 free. Among the Suburban and Provincial group, Alliance and Dublin realized 85, Brentford old 260, ditto new 206, Brighton and Hove ordinary 160, and North Middlesex $15\frac{3}{8}$ and $15\frac{1}{2}$. In the Continental companies, Imperial was done at 186 to 187 (a fall of 1), Union preference at $134\frac{1}{2}$, and European at from $19\frac{1}{8}$ to $19\frac{7}{16}$. Among undertakings of the remoter world, Monte Video changed hands at 13, Oriental at $138\frac{1}{4}$ and $138\frac{3}{4}$, Primitiva at $7\frac{3}{8}$ and $7\frac{7}{16}$, ditto preference at $5\frac{3}{8}$, River Plate debenture at $97\frac{1}{2}$, San Paulo at $19\frac{1}{2}$ (a fall of $\frac{1}{2}$), and ditto preference at $12\frac{1}{16}$.

NOTES FROM WESTMINSTER.

We are getting through the year's record of parliamentary work by spasmodic progress. Since the last review was made, nothing has transpired that calls for any extended comment.

Southall Works Preserved. There must be congratulation to the Brentford Gas Company on their success in opposing the Greater London Railway Bill—not in respect of the scheme regarded generally, but in respect of the cool plan of the promoters to cut right through the Company's Southall works. It was one of the most preposterous proposals we have ever met with in connection with gas-works that have been developed with an eye to future extension, to meet all the requirements of a healthily expanding district. However, the Southall works have been saved—the Committee who are considering the Bill coming to the conclusion that there are other public interests than those referring to the transit of the public that have to be served, and that require protection. No ordinary measure of compensation could have fitted such a case of disturbance as was here proposed, with the permanent uneconomical conditions that would have been entailed. Mr. Corbet Woodall and Mr. Alex. A. Johnson, the Company's Engineer and Manager, were the principal witnesses for the Company; and Mr. Balfour Browne, K.C., was leading Counsel. The upshot of the discussion was that the objectionable length of line which would have involved the Southall works was deleted from the scheme.

Aberavon Gas Order. We do not think the Aberavon Corporation have had full justice done them in connection with their appearance in Parliament up to the present this session. The Margam District Council have a Bill in Parliament which proposes the dismemberment of the Aberavon gas undertaking, and the purchase by them of the portion lying within the area of jurisdiction of the District Council. This Bill has passed the House of Commons; and it is pretty certain that Aberavon will oppose in the House of Lords. Now a Committee of the Commons, presided over by Mr. Mooney, have rejected the Order that was promoted by the Corporation, instead of taking what was obviously the correct course, of inserting a limiting clause the retention of which should be subject only to the passing of the Margam Bill in the Upper House. As it is, if the Margam Bill is now overthrown, the promotions this session of Aberavon and Margam will mean so much waste. Nevertheless, Aberavon would doubtless prefer to see the Margam scheme rejected, and the *status quo* maintained.

Manuring and Water Supply. The question of the pollution of sources of water supply is one of immense and indeed vital importance to communities; and a great deal of attention has been bestowed on the subject. The Bristol Water Company some time ago secured powers controlling the character of manures placed on land that might, wrongfully used, affect the purity of their water supply. The provision appears to have worked very well. The Rotherham Corporation have been seeking much the same powers in reference to their Ulley reservoir. A House of Commons Committee have, however, declined to allow their proposals. But they have announced their willingness to grant, if desired, clause 6 of the Model Clauses. This provides that the Corporation may make and carry into effect agreements with the owners, tenants, or occupiers of the lands, &c. The Committee were also of opinion that the Corporation's additional power was sufficient to provide for expenditure (subject to the sanction of the Local Government Board) for the prevention of pollution by arrangement, which would enable the Corporation to use the Ulley reservoir water. One other matter dealt with by the Bill to which there was no opposition, was the construction of a new service reservoir for the supply of the Kimberworth district. Rotherham has at present four service reservoirs with a storage capacity of under $1\frac{1}{2}$ million gallons, which is less than the daily consumption. In the new reservoir it is proposed to store water from the Derwent works, in which, as is well known, the borough is jointly interested with other important local authorities.

ELECTRICITY SUPPLY MEMORANDA.

Debts, Profits, and Reserves—Electric Wire Fusings—The Edinburgh Catastrophe—Accidents, Fatal and Otherwise—Gas-Engine Experiences—Caversham Council's Defenders.

We believe in a strong reserve fund; we believe in honesty; we do not believe in transferring the profits of municipal gas and electricity undertakings to the relief of the rates; but we do believe in handing back moneys of which the ratepayers' pockets have been relieved for the support of a trading undertaking in the days of its adversity or mismanagement. This is, succinctly put, a statement of our beliefs in this particular; and it is called forth by what transpired at a recent inquiry at Wrexham in connection with an application for further capital for the Corporation electricity undertaking. The Inspector was Mr. T. C. Ekin; and he appears to have criticized the placing of certain profits to the reserve fund instead of transferring them to the relief of the rates. The course adopted by the Council is the result of the advice of Mr. H. Ross Hooper in 1908, that the profits of the undertaking should be placed to a reserve fund. Now it depends entirely upon the point of view of Mr. Ekin whether he was right or whether he was wrong. It seems that, during the first lean seven years of the undertaking, the rates were compulsorily made to subscribe £3353 towards its support. And of the profit made during its lifetime, the extent of the repayment of the debt to the rates is represented by only £293. This is not honourable on the part of the undertaking; and it is a blot on its reputation that it has made no further attempt to discharge its obligation to the ratepayers. Repayment of a debt is not "relieving the rates." When the debt has been liquidated, then the Council should refuse to transfer any money in relief of the rates, but should devote any profits that may be made to the establishment of a strong reserve fund, and in other ways increase the stability of the concern. If our view is Mr. Ekin's view, then he is right; if he means that one of the proper purposes of a municipal trading concern is to perennially make profits for the succour of the town's treasury, then he is wrong, and we are dead-against him. One electrical contemporary says: "It is of the very essence of the success of these undertakings that they should be placed, as far as it is possible to do so, on the same basis as any other commercial undertaking; and certainly no business concern of any kind would neglect its reserve fund." Of course, to place a municipal undertaking on the same basis as any other commercial undertaking—that is, any sound commercial undertaking, and not a fraudulent or bankrupt one—it must pay its just debts.

It must be wearisome for our electrical friends to be constantly on the defensive. There is hardly anything that they do, or that electricity does, that they are not called upon to defend. Our electrical friends are extremely thin-skinned, and easily provoked to wrath, which there is good and disinterested authority for saying is not as things should be. They are always rampant when anyone talks about electric wires fusing; and, without intelligent consideration on one's own account, one would be entitled to imagine, after reading the ravings in the Electrical Press, that an electric wire would not demean itself by doing anything so absurd. It is all very entertaining when one or other of our contemporaries gets into one of these little tantrums. There was the "Electrician" the other week trying to be a bit caustic and sarcastic over the statement of a fire brigade official to an evening newspaper representative, that the "fusing of electric wires is almost impossible to prevent." "This is news indeed!" remarks the wily electrical writer. Not "it is untrue;" not "it is a falsehood." Nothing of the kind straight from the shoulder. But "this is news indeed!" Beautifully effeminate, inexplicit, and evasive. However, it implies that the fusion of electric wires can be prevented. Then for

Heaven's sake, and the sake of valuable lives and property, prevent it. If it is not done, and it can be done, criminal responsibility should rest somewhere in every case.

We see that little is being said in the Electrical Press about the result of the inquiry into the music hall disaster at Edinburgh, whereby human lives were lost. The jury appended to their verdict a recommendation that the city authorities should exercise more scrupulous care both in regard to the safe construction of theatres and more frequent examination of electric lights and water-hydrants. There is not the slightest question in this terrible case that the fire originated in the fusing of an electric wire connected to a lamp used by the unfortunate Lafayette. Mr. Frank A. Newington, the City Electrical Engineer, admitted that the fire might have been caused by the fusing of one or other of the wires connected with the lantern; and Sheriff Maconochie, in summing up, said he thought "the evidence distinctly came to this, that, for one reason or another, there was a fusing at the place where the flexible cord was attached to the lantern, or at some of the points inside the lantern, and that the insulation caught fire, the fire running up the wire, which then dropped down on to the inflammable material or touched the scene hung about it." Why does not the "Electrician" now "go for" Mr. Newington, Sheriff Maconochie, and the Jury, and tell them, in plain words, what it thinks of them? Our contemporaries like talking about inflammable materials and such like in juxtaposition to lamps, but to mention the fusing of wires is like holding a red rag before a bull. The London County Council and the City Corporation were careful to issue warnings as to wiring of electrical illuminations at the time of the Coronation; and the British Fire Prevention Committee also had a shot at the same subject. Among the items of advice was this: "Buckets of water should be provided, also boxes of dry sand, where electrical illuminations are employed." Why has the "Electrician" not written about this recommendation that "this is news indeed"?

The Electrical Inspector of Factories (Mr. G. Scott Ram), in his contribution to the annual report of the Chief Inspector of Factories and Workshops for 1910, has a rub at the indolence and negligence not only of many users of electricity in factories and workshops, but of electrical engineers and contractors, for whom no excuse can be found for not keeping themselves abreast of the requirements of their profession or trade. It will be remembered that a new set of regulations applying to the use of electricity in factories and workshops came, after a serious fight, into force in factories and workshops on July 1, 1909, and in electricity generating-stations a year later. It is not surprising to hear that a large number of factory owners appear to have done little to bring about compliance with the regulations. As a matter of fact, until an inspector calls, and tells him wherein there is defect in those things that he has had done, and wherein he has left undone certain things that he ought to have done, it is doubtful whether he knows of the existence of the new regulations. There may, too, be a belief in the virtue of the pocket-saving power of professed ignorance. However that may be, there is a measure of excuse for factory owners compared with electrical engineers, by whom, Mr. Scott Ram finds, many things are apt to escape notice until pointed out to them by the department's Inspectors. The Electrical Inspector has himself come across an electrical "consulting engineer" and a contractor who had never even heard of the new regulations. How many more are there like them? It would be strange if he had met the only two. No wonder that he finds non-compliance with the regulations is not limited to old installations. "I have come across some important plants put up since the regulations came into force, and by well-known firms of contractors, where the regulations evidently have not been taken into consideration." Electrical firms, too, are found who still supply many faulty switches, fuses, connections, hand-lamps, &c. Unsatisfactory and dangerous work is found to be due to the cutting of prices and acceptance of the lowest tender. The electrical engineer, manufacturer, and contractor ought really to mend his ways. Speaking of the danger of electricity to non-technical persons, the Inspector remarks that it is no use telling an artizan to be careful not to touch certain conductors or apparatus where he is working, as the conductors appear to him no more dangerous than a gas or water pipe. In the tabulated statements in the report, it is seen that electrical accidents in public supply stations and on electric railways and tramways numbered 45, of which four were fatal. Thirteen occurred at other stations. At general factories where electrical energy is employed, there is a slight increase in the number of accidents compared with the previous year. The total is 276, of which five were fatal, against eight the previous year.

The "Electrical Review" remarks that "so popular has electricity become in Strassburg, Alsace, as a means of motive power, that it is stated in a German contemporary that not a single gas-engine has been laid down in the town during the past ten years." A little later on in the same issue reference is made to a capital consolidation and conversion scheme of the National Gas-Engine Company, Limited; the paragraph concluding by saying: "As the concern is being taken over from July 1, 1911, a sum of money is being reserved out of the profits of the old Company sufficient to pay the ordinary shareholders of the old Company the *usual interim dividend at the rate of* 20 *per cent.*, and to the preference shareholders at the rate of 5½ per cent.; the balance of profits remaining after payment of the dividends will form part of the assets to be handed over to the new Company." Our contemporary might have pointed out in connection with the "tit-bit" first mentioned that, unfortunately for the electricity industry, the reported experience of Strassburg is not universal.

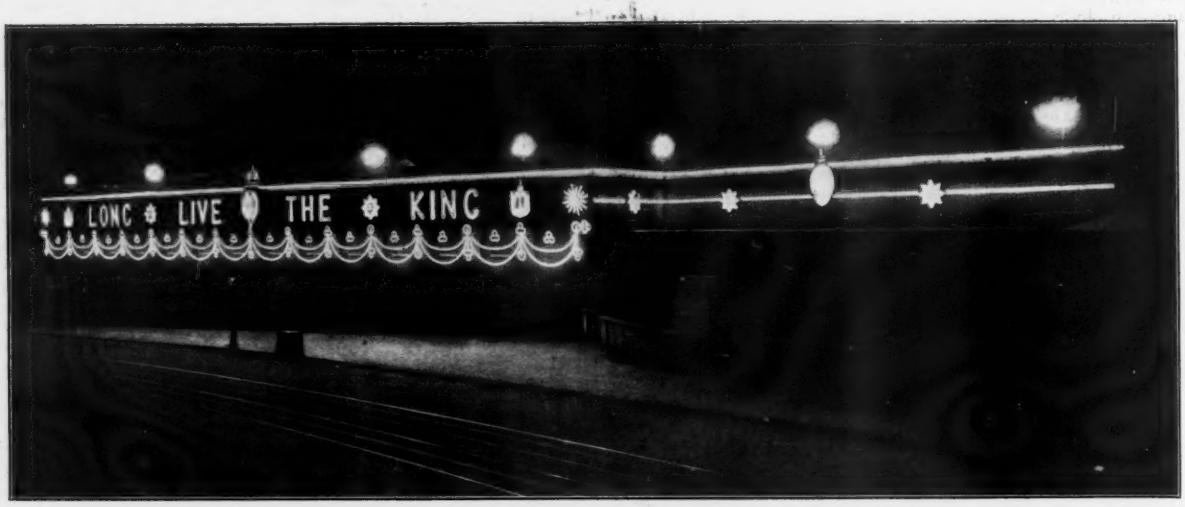
So it is "perfectly absurd" on the part of the "JOURNAL OF GAS LIGHTING" to suggest "that the Caversham District Council refused to consider the Reading Gas Company's tender because of animus against the Company." Inasmuch as the Gas Company had not submitted a tender, that was not exactly what we said in our article a fortnight since dealing with the hasty resolve of the Council to accept a tender for the public lighting from the Reading Electric Supply Company that will be—that must be—altogether unprofitable to the concern. However, what is quoted is (with the insertion of the names) what Mr. H. C. Dryland, Chairman of the Council, is reported to have said in an interview with a representative of the "Reading Chronicle." We do not see anything that is "perfectly absurd" in what we had to say a fortnight since; but we do see a tremendous amount of weakness in the defence by Mr. Dryland and Mr. Norris, Chairman of the Highways and Lighting Committee, of the attitude of the District Council, and stronger evidence than has yet been before us of suspected animus having brought about the loss to the Gas Company of the lighting of Caversham. We will go further now and say that the Caversham Council and the Reading Electric Supply Company appear to have made excellent companions in scoring one off the Gas Company. Neither Mr. Dryland nor Mr. Norris can profess that the Gas Company were not genuinely surprised when the tender of the Electric Supply Company was introduced and accepted by the Council, without any communication whatever passing between the Council and the Gas Company subsequent—not to their refusal to tender, but to the suggestion of the Board of Directors that the time was inopportune for submitting a definite estimate in view of the consideration then pending, of a revision of prices in the various areas, and pending, too, the settlement of questions affecting the borough boundaries. Were the Gas Company not entitled to the courtesy of a reply from the Council upon such a letter as that? The questions of courtesy and common business procedure do not seem to have entered very deeply into this particular question from the side of the District Council.

Let us see what happened. In order to give the Company further time to tender, should they desire further time, the Highways and Lighting Committee postponed the question for a month. So declare both Mr. Norris and Mr. Dryland. But the knowledge as to this magnanimous postponement was kept safely locked in the breasts of these generous councillors, who boast of having carefully considered the interests of the ratepayers. In the interview with Mr. Dryland, he was asked: "Were the Gas Company communicated with to this effect"—that is, as to the postponement. Mr. Dryland says: "No." Why were they not? There was the postponement; but the fact was not communicated to the Company, nor were they informed that, unless a tender was received within the month, the one submitted by the Electric Lighting Company would, if below the present gas prices, have to be accepted. Why, we ask again, was the postponement not communicated to the Gas Company? Did the Committee suppose it would reach the Company by some psychological means? If the information was not deliberately kept from the Company, was it an oversight? The Council would hardly dare to claim that it was the latter. Later on in the interview, Mr. Dryland says: "No doubt the Committee disapproved of the action of the Gas Company in regard to incorporation." We are afraid that Mr. Dryland and Mr. Norris between them have made a miserable muddle of their defence; and that all they have done has been to supply certain additional proof of what appeared to us to have been a piece of unfairness to the Gas Company. Further, we do not see any answer to the charge that the Council did not favour the Gas Company with a ten-years term upon which to tender, such as was preferentially allowed to the Electric Light Company. A long term for a contract naturally makes all the difference to prices offered. Nor, again, do we see any answer to the point as to the propriety of the Council binding possible early successors, as well as the ratepayers, to a contract for a term of ten years. We repeat that the Council were neither just to the Gas Company nor to the ratepayers; and we ask Mr. Dryland and Mr. Norris to meet the points fairly and squarely. Meantime, we thank Mr. Dryland for supplying in the interview information that was overlooked by Mr. Norris in framing his letter to the "Reading Chronicle."

Regulating the Temperature of Fuel Beds.—The specifications have been published of patents taken out for the United States by Mr. H. L. Doherty, who, as readers are aware, is now on a visit to this country, for a process for regulating the temperature of the fuel bed in gas-producing apparatus. According to an abstract in the "Journal of the Society of Chemical Industry," the claims relate to a method of, and apparatus for, heating gas-retorts. Producer gas is burnt in suitable chambers to heat the retorts, and the products of combustion pass through regenerators and preheat the air necessary for the combustion. After passing through the regenerators, some of the products of combustion are separated and compressed, and the compressed gas is used in an injector to induce a supply of air and to inject it into the generators, where the carbon dioxide is transformed into carbon monoxide. The quantity of waste gas thus introduced is so proportioned that the temperature of the producer is kept below that at which the ash of the fuel slags.

CORONATION ILLUMINATIONS.

"Long Live the King."



The Illuminations at the Vauxhall Works of the South Metropolitan Gas Company.

DESPITE the drizzling rain of Thursday evening and the deluge of Friday evening, which wetted slow-moving sight-seeing pedestrians to the very skin who were not provided with garments proof against the discomforting element, there was a ceaseless flowing tide of humanity with ardour undamped in its desire to witness the perfect pageant of light that had been provided, in all the main arteries of London stretching from Hyde Park Corner in the West to Bishopsgate, Leadenhall Street, and Fenchurch Street, in the East, in celebration of the great event of the week, and as a contribution to the expressions of a universal joy. But on both evenings, there was no difficulty—other than that caused by the rain, the water-swamped streets, and the trouble of trying to avoid the heavy drippings from trees, from water-soaked decorations, and from street-flanking temporary stands—in getting round to view the illuminations.

Of course, the most gorgeous displays were made in quarters of the West-end and City where opulence reigns; and, in those quarters, the scale and the lavishness of the illuminations were almost barbaric. Electricity was the predominant illuminant. Over the illuminations, the electricians secured a momentary triumph which we freely acknowledge, and congratulate them upon. But there are signs that it will take a little time for them to disillusionize themselves that this transient display means some big accession of permanent business. This order of illumination has really no consanguinity with illumination of ordinary character. For outside decorative illuminations of this particular kind, there is no question electric lighting does offer a flexibility and an ease of lighting up in almost inaccessible positions that gas cannot claim. The incandescent mantle—economical and brilliant—for ordinary permanent lighting cannot easily be adapted to this form of external decorative work; and therefore for this purpose it has had to give way largely—but by no means entirely—to the electrical competition. There were some excellent gas illumination schemes—especially in the City; and the smaller devices in open jet and crystal glass work were innumerable. There are those who have a preference for what one impressionist writer calls the "flickering, shimmering 'glare' that gas gives out like the trembling of a summer haze, and the wavering, quivering flame that a gentle breeze creates." Stretches of the still dead lights of small electric bulbs, soon palls on one, unless designs are largely variegated, or the deadness is relieved by coloured bulbs. Some of the installations with the best artistic effects about them were those that combined both gas and electricity—where the outlinings in electricity were broken by gas stars or other live gas devices, or where large crystal devices, with gas jets at the rear, giving eye-arresting prismatic effects, were the central features of an (otherwise) electric decorative scheme. Combinations of this kind were among the most original of the schemes. Beyond them, there was not much artistic originality. This applies to electricity as well as to gas. Though electricity boasts its flexibility, straight lines and festoons largely characterized the plans; and straight lines and festoons have had a run from the days of the old forms of illumination decoration with coloured glass buckets fitted with candles or small oil receivers and wicks, and later on of coloured gas-lamps carried on straight or curved tubing, or constructed into scroll and other devices.

There were in the West End, some really rich gas devices in crystal glass, especially upon some business premises. Several stately private houses (as mentioned in the list published in these columns on June 13) were illuminated by gas—Lansdowne House, for example, had a good display of open-jet work. A number of clubs, hotels, embassies, trading firms, including railway companies, assurance companies, and banks adhered to gas, and among them some excellent artistic work was to be seen. If we selected from among the banks, one good and attractive type of decoration, it would be that at Barclay's Bank (including the Standard Life and Atlas Assurance Companies). The central feature, in gas, were the words "George, King and Emperor," and the surrounding graceful devices showed that gas was far from being limited to only austerely stiff lines and easy curves. One of the most extensive and at the same time most beautiful schemes of mural gas illumination was to be seen at the Vauxhall Gas-Works of the South Metropolitan Gas Company. It graced part of the walls of the works lying between Vauxhall Bridge and the main entrance to the works; and our only regret is that it was so far away from the common track of the sight-seeing multitudes, though situated at one of the principal outlets and inlets from and to the Company's district used by the inhabitants in visiting the illuminations shown in the West-end. The photograph which we publish describes the features of the scheme, upon which we heartily congratulate the Company. In its design the Chairman (Mr. Charles Carpenter) took, we indirectly learn, great personal interest. He retains, there is evidence of it, not a little affection (though he keeps aloof from favouritism) for his old works at Vauxhall. However, the scheme was a most attractive one. People stopped in their progress past the works to admire; and the opinion was general that with all the patronage conferred upon electricity for decorative illumination purposes in parts of the West-end and the City, gas was far from being played-out in contributing to fascinating night spectacles. Long lines of star gas-jets, broken by emblems, stars, and other devices, with graceful festoons of light at the base, made a beautiful setting to the prayer—the prayer of the nation—"Long Live the King." It was a choice piece of work.

As has already been remarked, there were some excellent gas illumination schemes in the City—more particularly among large banks and insurance companies. It is true that on the present occasion the Bank of England relied entirely upon electricity, instead of on gas as at the last Coronation; but close by there was much gas to be seen—though not, it must be admitted, altogether at its best, owing to the unfavourable weather conditions. For instance, at the other corner of Prince's Street the Union of London and Smith's Bank had a very extensive display of coloured gas-lamps; and at the Mansion House, while the main part of the illumination was electric, gas was utilized for a number of effective flambeaux, and there were some handsome crystal devices. At the Royal Exchange, too, gas as well as electricity was employed. The top of the building was outlined with coloured gas-lamps; and in front there was a row of gas-flares. Above them was a crown, also made up of gas-lamps; and high up over it was an imposing crystal "George V. Rex et Imp. F. D." Close by was another large gas scheme at the offices of the North British and Mercantile Insurance Company. Here, in addition to the outlining of the building with coloured gas-lights, there were a number of crystal devices—perhaps the best being a large "God save the King," surmounted by a sparkling crown.

To the great number of familiar but strikingly handsome crystal devices noticed during a walk through some of the main City thoroughfares it is impossible to refer in detail here; but as showing that the older illuminant is still favoured by many of the large business establishments, mention may perhaps be made of some of the banks and insurance offices that were noticed to be outlined with coloured gas-lamps (besides having various devices lighted by gas), in addition to those already alluded to: The Bank of Australasia; the Capital and Counties Bank, Bishopsgate; the

National Provincial Bank of England; the Royal Bank of Scotland; the Bank of British North America; the Scottish Widows' Fund Office; the Indemnity Mutual Marine Assurance Company; the British Law Fire Insurance Company; and the Atlas Assurance Company. The Carpenters' Hall and Fishmongers' Hall were also similarly decorated. Many other premises had rows of gas-lamps, as well as crystal devices.

Then there were naked gas-jets, which played no inconsiderable part in the City illuminations. The Leadenhall Street offices of the Port of London Authority may be cited as a very conspicuous example of this style. Here the motto, "Floreat Imperii Portus," under the arms, which covered a large part of the front of the building, attracted much attention. In another street, there were two large ships similarly outlined. These were of widely different types, as will be gathered from the dates beneath them—1824 and 1911. Two other instances of this method of illumination also deserve special mention here. The first was at the offices of the Marine Insurance Company, and the second on the premises of the London City and Midland Bank, where there were a large number of effective naked jets, each having six flames.

In the public press, the electricians have made excellent use of the prominence obtained by them in the illuminations. There have been published among other things some relative costs of decorative illuminations by gas and electricity which are insinuatingly favourable to electricity. It is not made clear by the daily papers that figures referring to open gas-jets and large gas-flares have nothing in common with gas for ordinary illumination by incandescent gas-burners; and that the electric lamps used are all of the small order that are not much good for practical purposes in ordinary illumination. It has, for instance, been widely published that the illuminations at the Bank at the time of King Edward's coronation cost £8 an hour for gas as compared with the "reasonable estimate" of 7s. 6d. an hour (using small metallic filament lamps) for electricity. But it must not be forgotten that at King Edward's Coronation 30,000 gas-burners were used, against only 5000 electric bulbs on this occasion, and that then ten great gas-consuming flambeaux, 10 feet high, were incorporated in the scheme. Then, again, the cost of installing the electric light at the Bank on the present occasion ran well into four figures.

For these illuminations, the electricity stations supplied current at the low figure of 1d. and 1½d. per unit, in order to get the business. Had they not done so, they would no doubt have lost a large amount of patronage, in view of the expense of installation. The illuminations came well to their aid, as, without them, with the large business establishments of the West-end and the City—their principal consumers for lighting purposes—closed, they would have experienced the light loads of Sunday over these two days of public rejoicing.

PARADE OR SCALE LIGHTING.

Recent Examples in South London.

Parade Lighting—A View in the Lewisham High Road.

Another View in the Lewisham High Road.

Lewisham High Road from the Opposite Direction.

An Example from Rye Lane, Peckham.

A View in the High Street, Streatham.

A Second View in the High Street, Streatham.

The Return of Pall Mall to Gas Lighting (High-Pressure Lamps).

One of the notable features in the recently made history of the gas industry has been the brilliant—brilliant in more ways than one—success in the field of outside shop illumination on the system known as parade or scale lighting. The high-pressure inverted lamp, and the simplicity of piping great lengths of main thoroughfares and supplying gas at any required pressure from one small compressor-station, have enabled this to be achieved. The shopkeepers, paying an inclusive price, being relieved of all trouble in connection with the lamps, and knowing their reliability, like the system; while the economy of the system, and the rates at which lamps can be supplied per annum, are very much disapproved of by electrical competitors. But their disapproval does not count for much. What does matter is that the gas industry is, where the system is applied, getting the outside shop lighting business at a rate that is highly satisfactory.

Some really magnificent samples of parade lighting have lately been seen during our perambulations in the district of the South Metropolitan Gas Company. An especially good installation is in the Lewisham High Road. The lamps used are of the well-known Keith inverted type; and the supply to them is taken off the specially laid high-pressure gas-main—the pressure being obtained by the use of duplicate gas-engine driven compressors of the Keith make. Our first photograph shows part of this installation. In the run portrayed, there are some hundred 1500-candle power lamps, which are supported on columns erected specially on the kerb at approximately 22-feet centres. The second and third views are of another part of the road from different standpoints; and these show the lights on two sides of the street.

The succeeding view is the reproduction of a photograph taken in Rye Lane, Peckham. The high-pressure gas-main in this district serves Rye Lane and High Street, as well as Queen's Road. In these thoroughfares there are already fixed nearly 200 of the Keith lamps, chiefly of 1000-candle power. This is a good typical illustration of the parade lighting idea, which has become very popular all over London.

We turn next to pretty and popular Streatham. In the High Street is found another excellent display of parade lighting. The lamps are also of the Keith type, and are supplied by a specially laid high-pressure main, which is served by Keith rotary compressors—the plant consisting of duplicate compressors and gas-engines. The lamps at the highest elevation are of 1500-candle power; and those on the shop-facias are of 1000 and 500 candle power.

In all these cases, the lights are a great attraction from dusk onwards. There is no doubt about it that people like light; and where there is light people will go. The pavements during the evening in front of these ranges of shops prove it.

Though not coming in the category of parade lighting, we have an interesting view of the lighting of Pall Mall, forming part of the high-pressure installation of the Gaslight and Coke Company in connection with their City of Westminster street-lighting contract. Pall Mall, it will be remembered, was the first street to be lighted by gas in London. For some years prior to last winter, it was lighted by electric arc lamps. Now gas has returned; and Keith high-pressure lamps thoroughly illuminate this centre in the fashionable life of the Metropolis. It is splendidly illuminated; and the improvement that has been effected has been the source of much admiration.

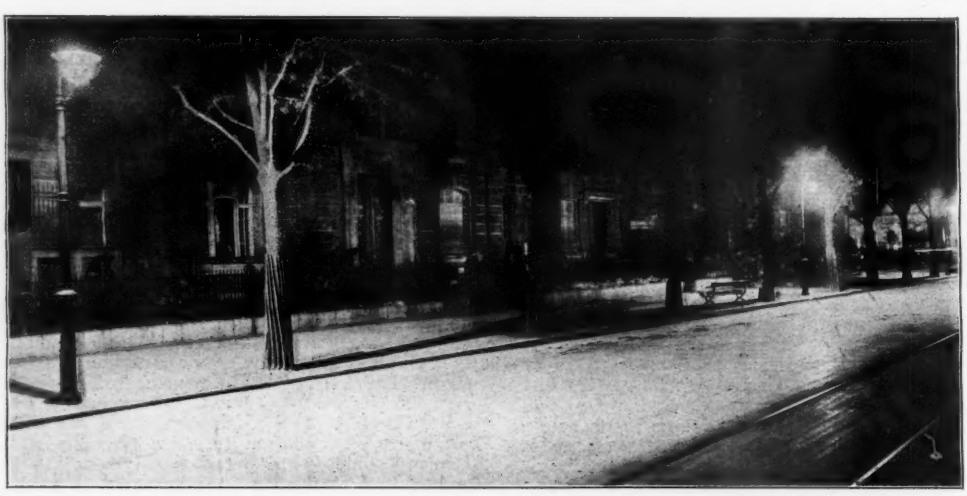
HIGH-PRESSURE GAS LIGHTING ON THE CONTINENT.

[COMMUNICATED.]

A Good Example of Berlin City Lighting.

EVER since the introduction of electric lighting more than thirty years ago, the struggle for supremacy between this system of illumination and gas lighting has been watched with keen interest, not only by the people engaged in the two industries specially concerned, but also by a large section of the general public, particularly the investing portion of them. It was for a long time thought that the suppliers of electricity had a decided advantage over their competitors from the fact that they were able to produce lamps of high candle power with which to illuminate effectively large open spaces. The activity of the gas industry, however, dispelled this illusion; for by the introduction of the high-pressure system of gas lighting it was demonstrated that illuminating effects could be obtained which were not only in every respect equal to, but actually better than, those produced by electric lamps. In England, examples of this can be shown in the Metropolis and elsewhere. On the Continent, the system in which high-pressure air is employed in connection with gas has had a remarkable development; and it is now in use in many cities of international reputation and much importance for the lighting of the public thoroughfares.

A representative system of high-pressure gas lighting is that introduced by the Auer Company of Berlin under the name of the "Pharos;" and, so far as the employment of high-pressure air is concerned, it was, until quite recently, the only one in use in German cities. Stuttgart is a noteworthy example of the merits of the system. It is specially interesting to gas people, as it shows how, in competition with the latest and best types of electric arc lamps, and after a struggle extending over several years, the "Pharos" lamps have proved their superiority, and therefore have been given the preference. It is an important fact, in connection with this installation, that both the gas and electricity supply to the city are in the hands of the Municipality. The square in front of the Royal Castle and eight of the most important business streets in the immediate neighbourhood were last autumn illuminated by "Pharos" lamps. It will be seen, from the accompanying reproductions of photographs, that, just as in the case of electric arc lighting, the "Pharos" lamps can be fixed on suspensions above the centre of the roadway, and lowered by a special arrangement to the side-walk without interference with the traffic. After the lamps were put up, the authorities and inhabitants of the city were so enthusiastic over the new light, which compared most favourably with the electric illumination in other streets, that the people presented a petition for its extension. The result has been an order from the Municipal Gas Department for an additional forty lamps.



Lighting of a Berlin Suburban Road.

In many other cities—for example, Oldenburg, Leipzig, Jena, Altenburg, Witten, and Essen—advantage is being taken, as in Stuttgart, of the merits of the "Pharos" light, the use of which is rapidly extending. A remarkable instance of the development of the high-pressure gas and air system is afforded by Berlin, reference to which city has been made on several occasions in the "JOURNAL." Up to the year 1905, something like 15¼ miles of the streets were lighted by electric arc lamps. During the following five years, however—*i.e.*, from 1906 to 1911—only about a mile-and-a-quarter of public thoroughfare was added; and it is not intended to put up any more electric lamps. It is quite otherwise in the case of gas. Up to 1905, there were only 4¼ miles of streets lighted by high-pressure gas-lamps. But during the succeeding five years 31¾ miles were added; and a scheme has been prepared for the installation of high-pressure gas-lamps in another 42 miles. In the present year, the Berlin Municipal Gas Department have placed orders for 505 additional "Pharos" lamps. The increased use of high-pressure gas lighting is tending to break down—at all events in Germany—the widespread prejudice against gas, and to correct the very common error of considering it as obsolete and the electric light as more up-to-date. The fact that in many of the leading cities gas is rapidly replacing electricity for public lighting purposes affords convincing proof that high-pressure gas has a most promising future.

[Those of our readers who visited the Brussels Exhibition last year will doubtless remember that the "Pharos" light was shown in the tastefully decorated pavilion of the Auer Company in the grounds. Various examples of its installation are given in the accompanying reproductions of photographs.]

A Street in Stuttgart.

Two Examples of Workshop Lighting by "Pharos" Gas-Lamps.

THE WILSON VERTICAL RETORT INSTALLATION AT GLASGOW.

[COMMUNICATED.]

MANY members attending the recent meeting of the Institution of Gas Engineers accepted the President's invitation to visit the "continuous-intermittent" vertical retorts at the Temple Gas-Works. One could not fail to be impressed with a system which had all the appearance of being simple and effective.

There is an absence of mechanical working parts which impresses the practical man. The vertical retort is considered as a means whereby the law of gravity displaces mechanical power; and it is assuredly in this direction that reliability and a saving of wear and tear may be obtained. The coke-chamber below the retort and the provision of a water-sealed valve at the bottom are effective; and the admission of steam before the discharge of the coke quenches the coke in a scientific manner.

At the Temple works there are four large retorts, each of which is partly discharged of its coke, and charged with coal every four hours. The draw is so arranged that one retort is operated every hour—a process which takes but a very few seconds. The valve at the bottom of the coke-chamber is worked by hydraulic pressure; and as soon as the valve is opened, the coke falls out into a specially constructed barrow, designed to hold a full charge of coke. Coke from the bottom of the retort drops into the vacant space in the coke-chamber; and thus the whole charge in the retort drops a few feet every four hours. When discharged, the coke is quite quenched; and it is of a quality which is certainly superior in every respect to that produced from the same class of coal in horizontal retorts in the adjacent Dawsholm works.

After the coke is discharged, the coal is admitted at the top through a large plug cock; and, as in the case of the coke, the operation takes only a very short time. The producer at the side of the setting is constructed of sufficient height to hold twenty-four hours' supply of coal, which is conducive to economy in working. It was noticed the pressure both at the top and the bottom of the retorts showed in all cases about level gauge.

Working in this manner, it will be seen that the advantages of both the continuous and intermittent systems are gained, without their respective disadvantages. By partially discharging the coke every four hours, it provides plenty of time for the coke to be formed in its natural size and shape; and the hanging-up of the charge (should any be experienced) can obviously only happen at the time when the difficulty can be readily observed and overcome. The discharge being intermittent, there is no necessity for the provision of any mechanical means for extracting the coke. Thus is gained the advantages of the intermittent system. By being to some extent continuous, the gas from each retort is maintained of fairly uniform quality; and the charge is moved sufficiently often to provide a free passage for the gas from the retort. There is, too, an entire absence of smoke, dust, and flame during working operations.

The results from the large installation now being erected at the Dawsholm works, to make 5 million cubic feet of gas per day, will certainly be awaited with the greatest interest.

At Ilkeston, the Corporation decided to illuminate the Town Hall and Free Library by electricity, and place a 50,000-candle search-light on the church tower. The lighting of the Town Hall was successful; but when the current was switched on to the Library by the Mayor, a fuse blew, and so damaged the starting-gear that it was out of action on Thursday night. The search-light also failed to act; but, as the result of the efforts of the officials of the Electricity Department, it was induced to make a modest attempt at lighting on Friday night. This only shows that electricity is not to be relied upon in the domain which is claimed to be peculiarly its own—that of illumination.

THE SULPHATE PLANT AT THE GRANGETOWN (CARDIFF) GAS-WORKS.

For Description, see Opposite Page.

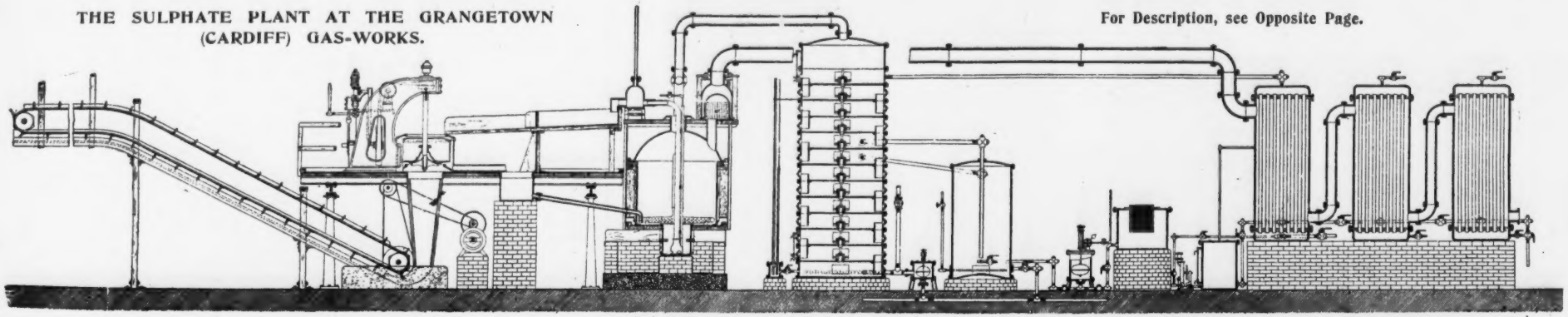
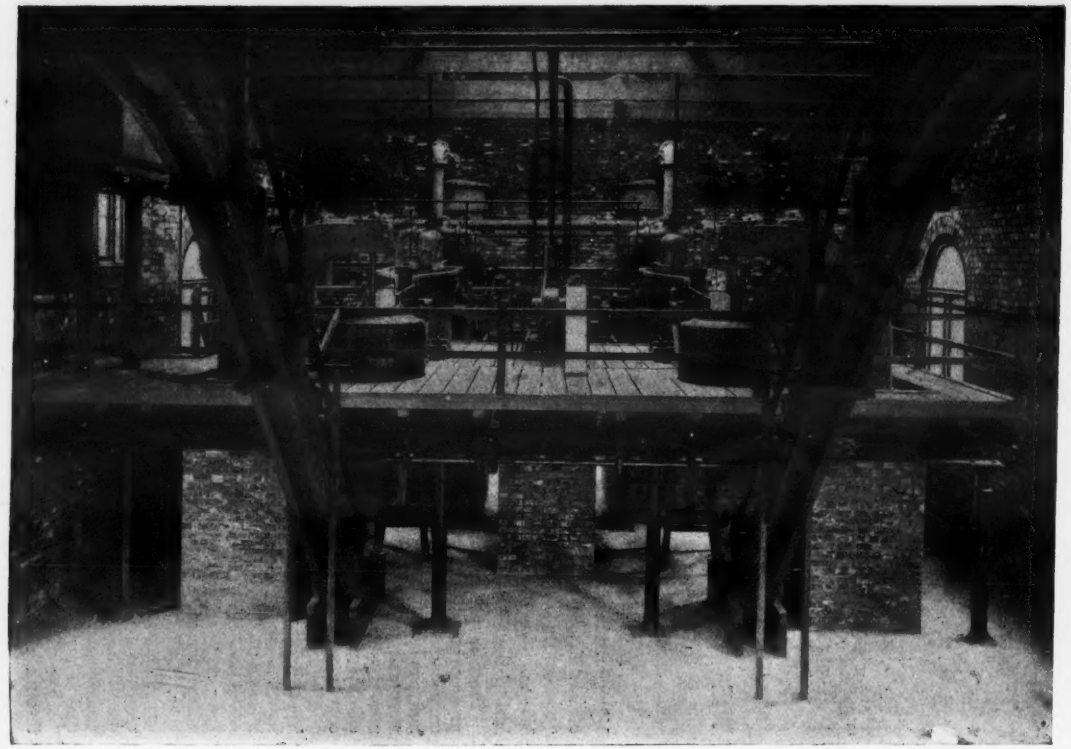
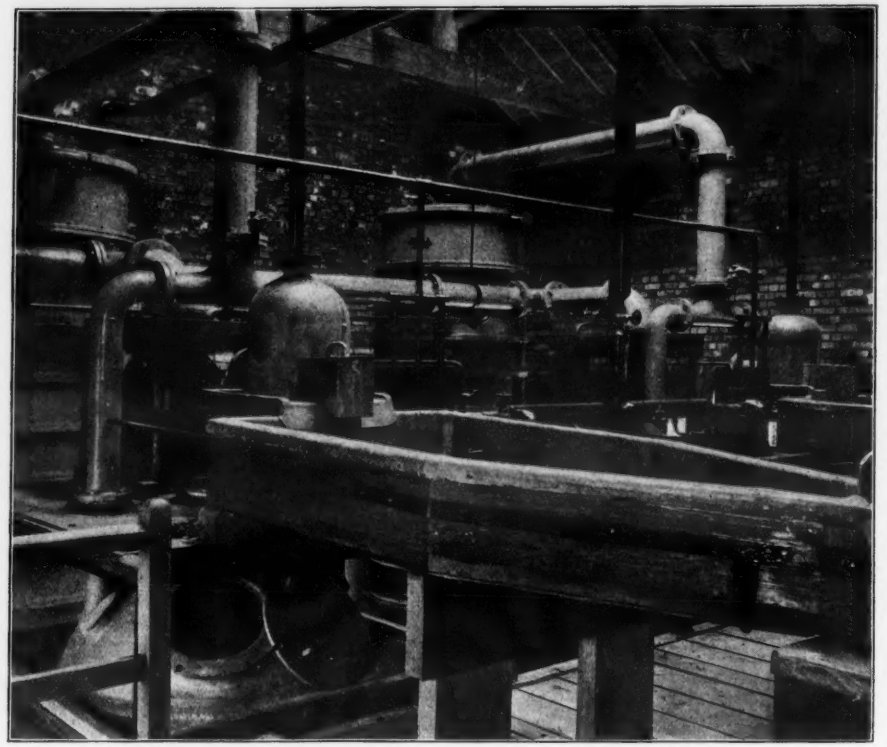


DIAGRAM SHOWING THE RANGE OF THE WILTON PLANT.



General View of the Sulphate Plant taken from the Sulphate Store.



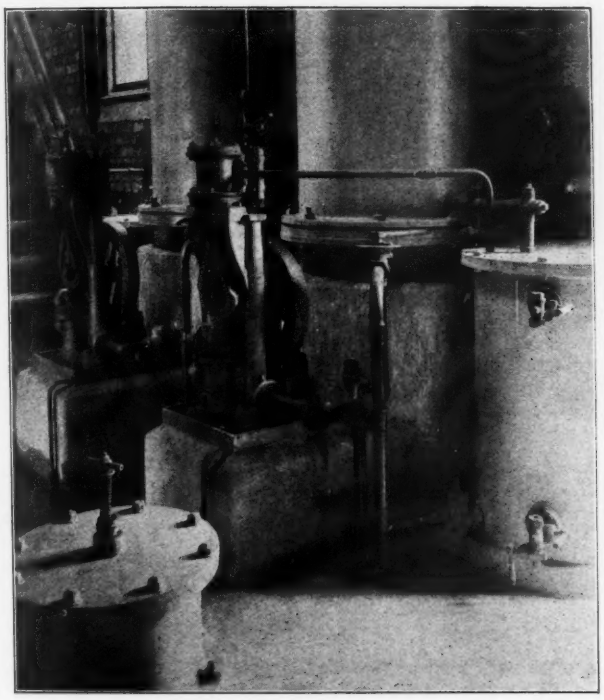
View of the Sulphate Plant taken from the Working Stage.

A SULPHATE PLANT AT GRANGETOWN.

Opening by the Chairman of the Cardiff Gas Company.

SULPHATE plant erected by the Chemical Engineering Company at the Grangetown works of the Cardiff Gas Company was opened on Monday, the 19th inst., by the Chairman of the Gas Company, Colonel William Taylor, M.D., J.P. Among those present were the Deputy-Chairman (Colonel H. O. Fisher, J.P.), and the other Directors, accompanied by many notable local visitors, including the Lord Mayor of Cardiff (Alderman Charles Bird, J.P.), the Town Clerk (Mr. J. L. Wheatley), the City Engineer (Mr. W. Harpur, M.Inst.C.E.), the Chairman of the Lighting Committee (Alderman Courtis), and Mr. E. W. M. Corbett.

The Chairman was asked to open the plant by Mr. George Wilton (who, with Mr. Norman Wilton, represented the Chemical Engineering Company). This Colonel Taylor did by turning on steam into the saturator by means of a wheel, which was afterwards presented to him as a souvenir. The wheel was silver gilt, and suitably inscribed and embossed with flags, emblematical of the coronation.



Condensers for the Waste Gases from the Plant.

The sulphate of ammonia works consist of two complete units, each capable of producing 4 tons of dry sulphate of ammonia per 24 hours, arranged so that they can be worked independently or together, as desired. The process, briefly described, is as follows: The gas liquor first passes through multitubular heaters, and is raised to boiling-point by the waste heat from the saturators. It then enters the top of the liquor-stills, and slowly flows, by a series of weirs, in a downward direction through the fifteen chambers to the automatic exit. Steam is admitted at the bottom of the stills, and bubbles through the liquor in each chamber, travelling in a reverse direction to the liquor, and carrying with it the ammonia and combined gases, sulphuretted hydrogen, and carbonic acid, which pass away from the top of the still to the acid saturator. To complete the removal of fixed salts, it is necessary to add lime, which is automatically admitted in the middle chamber of the still in conjunction with the auxiliary liming still, which acts as a reservoir and retains the lime sludge. The lime is slaked with spent liquor from the stills, and forced at boiling temperature at the required rate by automatic pumps.

The saturators are of the round closed type, constructed of 40 lb. chemical lead. In these saturators, the ammonia is distributed by perforated pipes and bubbles in the acid bath, which is continuously fed with acid in proportion to the ammonia. The chemical reaction produces a boiling-heat, and sulphate of ammonia is deposited in crystal form into the well at the bottom of the saturator, from which it is pumped by means of a steam discharger to the receiving tray, whence it gravitates to the centrifugal machine at intervals—the tray holding a charge of about 4 cwt. The centrifugal machine separates the mother liquor, which flows back to the saturator. After two minutes spinning, the centrifugal machine is stopped; and the dry sulphate of ammonia is dropped through the centre-valve on to the elevator conveyor, and deposited in the store, where accommodation is provided for about 200 tons. The acid-store consists of four tanks, with a total capacity of 80 tons, into which the acid will be received from railway tank-waggons. Two overhead supply tanks are also included; and the pumping is effected with compressed air and an acid egg.

In conjunction with the plant, two Lancashire steam-boilers have been provided, and fitted with Wilton's furnaces for burning coke breeze; and provision has also been made for superheating the boiler feed with the surplus waste heat from the saturators. The waste gases from the saturators, after cooling, will be purified with oxide of iron, and the sulphuretted hydrogen recovered as sulphur. For this purpose, four purifiers have been provided, and are operated by hydraulic change-valves. The whole of the condensed liquors (devil liquors) gravitate to sealed receivers, and are pumped, together with the gas liquor, through the liquor-stills, which renders them inodorous. The plant is housed in a substantial brick building, 95 feet by 35 feet, by 21 feet high to the eaves. The buildings, roofs, chimney-stack, &c., were designed by the Engineer of the Company (Mr. H. D. Madden).

After leaving the sulphate plant, the Chairman opened the new mess, bath, and dressing rooms, which had been incorporated with the extension of the new retort-house. The dressing room contains three deep tiers of lockers made of steel, each with a separate lock and key, so that the men can change their clothes. The bath-room is fitted with a line of shower-baths—hot and cold water being obtainable—and all the necessary accessories. The mess-room is capable of seating a hundred men at a time, and is supplied with cooking and hot-water apparatus.

Subsequently, the Chairman, Directors, and visitors—who were escorted by Mr. George Clarry (the Manager and Secretary), Mr. H. D. Madden, Mr. A. E. Williams (the Works Superintendent), and assistants—inspected the extensions which now complete the new retort-house. This house contains forty beds of through retorts, eight in each bed. The retorts are discharged and charged by West compressed air machinery, which was seen at work; and at the lower end of the retort-house, the party were much interested in the operation of the West new power stoker, which discharges and charges in one operation.

An inspection followed of some works in course of construction —such as engine-rooms, &c. A notable feature was the grass lawns and flower-beds in the approach to and around the works; and great pleasure and surprise were expressed at the position of the sulphate plant—being approached, as it is, through a grass plot and beds of flowers.

After the opening, the guests were entertained at luncheon at the Company's offices in Bute Terrace.

The loyal toast having been duly honoured, that of "The Lord Mayor and Corporation of Cardiff" was proposed by Colonel Taylor, who occupied the chair. He said he hoped the representatives of the city had been agreeably surprised to find such complete works in their midst.

Replying, the Lord Mayor remarked that he had been intensely interested in looking over the Grangetown works. The only regret they as a Corporation had was that they had not a little share in the Company. In submitting the toast of "The Cardiff Gaslight and Coke Company," he expressed the hope that Colonel Taylor would live many years in their midst—not only to preside over the deliberations of the Company, but to continue to render those public services which he had performed with so much ability in the past.

In the course of his reply, the Chairman said that when the Company last went to Parliament the City Council opposed them. Well, the Company reduced the price of gas 2d. per 1000 cubic feet, which meant £7000 per annum. They could have done much with this £7000 in providing for renewals and other works. They were entitled to restore the 2d. now, but would not do so. Owing to scientific progress and economy in manufacture, not only would they not put on the extra 2d., but he believed that by the end of the year they would be able to reduce the charge by 1d., to 2s. 6d. per 1000 cubic feet. He and his co-Directors were satisfied that there was a great future for sulphate of ammonia. The cotton growers of America alone were likely to take all the available world's supply. The demand for agricultural purposes was very great indeed. By its use, growers of potatoes had increased their yield from 6 tons to 14 tons, and in some cases 20 tons, per acre. It was also invaluable for sugar beet cultivation. In Germany, the home consumption was greater than the supply. He was very proud of his position as Chairman of the Company, and was glad to inform them that the gas consumption was advancing by leaps and bounds.

Colonel Fisher proposed "The Guests;" and Mr. Harry Cousins and Mr. George Wilton responded. The latter said he had put up 120 sulphate of ammonia plants in different countries; and he considered those at the Grangetown works the finest in the world. Other toasts were "The Manager and Engineer" (to whose work Colonel Taylor paid a high tribute), and "The Chairman."

Coronation Honours.—In the list of honours conferred by His Majesty the King on the occasion of his coronation, we notice the following: A baronetcy for Sir Boverton Redwood, who is well known for his researches into petroleum and its products, and is adviser on petroleum to several Government Departments and important public bodies; and knighthoods for Mr. Thomas Ratcliffe Ellis, the Secretary of the Federated Coalowners' Association, and Mr. G. Croydon Marks, M.P., senior partner in the firm of Messrs. Marks and Clerk, consulting engineers and patent agents. Dr. Benjamin Arthur Whitelegge, C.B., the Chief Inspector of Factories, whose annual report is noticed elsewhere, has been made a K.C.B.

GLASGOW CORPORATION GAS DEPARTMENT

A View in the Show-Rooms.

The Range of Furnished Rooms.

A VIEW OF THE EXTERIOR OF THE BUILDING

THE INSPECTION OF FACTORIES.

In the last number of the "JOURNAL," it was mentioned that the annual report of the Chief Inspector of Factories and Workshops (Dr. B. A. Whitelegge, K.C.B.) had just been issued. It is followed by a summary by Mr. H. M. Robinson, the Deputy Chief Inspector, of the divisional and branch reports, which contain several references to matters of special interest to "JOURNAL" readers. They are reproduced below, and are dealt with in our editorial columns.

Under the head of "Sanitation," Mr. Robinson offers some remarks on the subject of ventilation. He says, as regards injurious fumes, the Inspectors report great improvements effected by the application of local mechanical ventilation to linotype machines and stereotyping in letterpress printing works, to lead and spelter smelting, and to gas-irons in laundries. Flues have also been supplied to many heating-stoves which were found to be unprovided with any means for carrying off products of combustion. One of the Inspectors (Mr. D. R. Wilson) investigated the effect of unventilated gas-irons on the air of laundry workrooms. Traces of carbon monoxide (less than 0·2 volume per 10,000) were found where ordinary coal gas was used. But the proportion was higher (0·2 to 0·8 volume per 10,000) where the gas was under pressure; and, in the comparatively few instances where producer or suction gas was employed for the purpose, as high a proportion as 6·6 or 8·6 was occasionally found near the appliances, although, owing to free ventilation, the proportion in the air of the room generally was much less. In some instances the use of producer gas had been given up, and ordinary gas substituted, by reason of the employees suffering from headache and faintness. Mr. Robinson says the inquiry is being extended to other works where similar appliances are used.

Under the head of "Industrial Poisoning," Mr. Robinson refers to the greatly increased use of gas for power purposes, and also for heating irons in laundries; and he says numerous instances are quoted of the ill-effects, and sometimes fatal results, caused by the escape of poisonous gases. Stress is laid upon the importance of mechanical ventilation and careful attention to all pipes, joints, and connections when producer gas is used in laundries.

SHOW-ROOMS IN SAUCHIEHALL STREET.

Another View in the Show-Rooms.

Another View of the Suite of Rooms.

APPEARED IN LAST WEEK'S "JOURNAL," p. 836.

Dr. Legge here supplies a table showing the number of cases of "gassing" during the year, and gives very full details of the causes, symptoms, and effects produced. He also adds some notes on two papers dealing with this subject which were discussed at the Brussels Congress.

Coming to the divisional reports, the first to require attention is that of Mr. A. P. Vaughan, the Superintending Inspector of the South-Eastern District. On the question of the temperature of workrooms, he says that, far too frequently, the only method of warming is the use of open gas-jets; and in these cases the evil is usually aggravated by the closing of all windows and ventilators. He points out that a great deal of attention has been given to flueless gas-stoves of various types; and he adds that "unfortunately they appear to find considerable favour with occupiers." Apart from the question of interference with the purity of the air, upon which point he says there is much evidence against them, they are clean, convenient, and inexpensive; and as they are continually pushed by the makers and by some gas companies, the number found in use is large. In many cases, however, the addition of flues or the substitution of satisfactory types of stoves has been secured. Mr. Clark (East London) mentions a case in which an air sample taken from a millinery workroom warmed by a flueless stove contained a proportion of 39·5 parts of carbon dioxide per 10,000. The stove was replaced by one fitted with a flue; and another air sample taken under almost similar conditions contained only 8·7 parts. Mr. Harston (South London) furnishes particulars regarding a new type of gas-stove which promises to be the means of solving much of the difficulty at present encountered in obtaining satisfactory methods of warming. It is fitted with two inlet-pipes connecting with the outside air. One of these conveys air to the combustion chamber, and the products of combustion pass off through a flue into the external atmosphere; while the other conveys fresh air to a separate chamber which is heated by the gas, and the air is discharged into the workroom through outlets at the top of the stove. Mr. Vaughan says, though it is perhaps, with the present limited experience, too early to express a definite opinion as to the merits of the stove, the principle appears to be one that is likely to remove the objections to which many of the earlier types of stoves are open. Elaborate tests which have been carried out show very satisfactory results, and compare most favourably in every way with those obtained under conditions as nearly similar as possible, in the same room, but with a flueless

stove in use. The new stove had the advantage in regard to the amount of gas consumed, and effected a great improvement, which was immediately noticed by the workers, in the general conditions of the atmosphere.

The Superintending Inspector of the South-Western District (Mr. Augustus Lewis), under the head of "Sanitation," refers to a bad case at Cardiff, where, in a room providing 321 cubic feet of space for each person employed therein, the sample of air taken contained 37·1 parts of carbon dioxide per 10,000 volumes. He says the use of gas-heated irons in laundries, especially where any kind of suction gas is supplied for the purpose, has had, and is still having, "the attention which its effect upon the health of the workers demands." The Inspector for Dublin (Mr. May) records cases where hot-water pipes for warming workrooms have been adopted, and flueless gas appliances ventilated. Where electric radiators were tried, they have not, he thinks, been found to be very satisfactory.

Mr. Gerald Bellhouse, the Superintending Inspector of the North-Western District, refers to flueless stoves, which he says have been shown to be one means by which air is liable to become vitiated; and the Inspectors have therefore been giving special attention to their use. It is commonly understood, he says, that the makers of some at least of these stoves are prepared to guarantee purchasers against prosecution; but, in spite of this, occupiers have, in every case when objections have been raised, either changed their stoves or fitted them to ventilating flues.

The Superintending Inspector for the Northern District (Mr. R. E. Graves) also refers to flueless gas-stoves, in connection with the reports of some of the Sub-Inspectors. Mr. Newlands (Dundee) states that several of the gas companies in his district are not fitting stoves without flues in workrooms coming under the Factory Act. Mr. Buchan (Edinburgh), referring to a dressmaking-room in which he found 32·4 parts of carbon dioxide per 10,000 volumes, says the occupier was hard to move, because the stove-makers had assured him that the use of the stove would not vitiate the air. A hood has, however, since been fitted. Mr. Cook (Glasgow) refers to the greatly improved atmospheric condition of workrooms consequent on measures having been taken to convey the products of combustion away from gas-stoves used for heating irons, &c.

PUBLICITY AND SALES OF GAS.

By Norton H. Humphrys, F.C.S., Assoc.M.Inst.C.E.

While in no way desirous of belittling anything that has been said or done by the Publicity Committee attached to the Institution of Gas Engineers, I would venture to express the opinion that there are some points (of equal importance as regards increased sales of gas to any that have yet been brought forward) that so far do not appear to have attracted much attention. It would be ungracious, even if such were possible, to take exception to the able and perspicuous memorandum in which the objects of the Committee have been set out. But it is worth while, even at this early stage, to assume that the new departure will be carried through, and consider its effect on existing arrangements.

One would like to see a little more emphasis placed on the fact that the present movement has not been necessitated or originated by the usual causes that lead to increased enterprise in the selling department—a decrease of sales. In the case of electricity (a comparatively new business) no notice is likely to be taken of any methods, however odd or eccentric, that may be adopted with a view of getting business. But gas has been established for 70 or 80 years, and some curiosity may be aroused as to the reasons that have led to a change of front, or why it should be all at once discovered that the labours of a Publicity Committee are urgently called for. As regards the trade itself, it may be quite possible that—in the very natural desire to arouse a feeling of sympathy with the movement among the large majority who as yet have not participated in it, and who hesitate from various reasons, which for the most part are remote from the financial risk of subscribing 2s. 6d. per million cubic feet of gas made per annum—some injury may be done in the way of creating an impression that things are in a bad way with the sales of gas, and that a strenuous combined effort is called for as a means of saving the situation. Part of the work of the Publicity Committee might well be devoted to disseminating accurate statistics as to increase of consumers, of burners, cookers, and quantity of gas used, over the last five years. The public have a distaste for plain straightforward figures, and therefore the facts would have to be arranged in popular style—such as how many miles would be lined out if the consumers were arranged a yard apart in one long row, or how many square miles would be covered by a gasholder large enough to contain a year's supply of gas.

Possibly the present prosperous condition of affairs constitutes one of the greatest hindrances in the way of the Publicity Committee. If the sales of gas over the year 1910 had shown a drop of 10 per cent. or so as compared with those for 1909, instead of a comfortable increase, there would be no difficulty about the raising of a 2s. 6d. or even of a 5s. levy. But it is difficult to persuade gentlemen who look upon the annual increase in sales as an established law of the Medes and Persians, and are continually occupied with questions relating to the extension of plant and issue of fresh capital, as to the necessity for a new departure on hitherto scarcely explored lines, or to give a tangible form to the advantages that may be expected to follow. The experiences of the past go to show that, given a definite object that can be seen and felt, directors and shareholders are not backward in subscribing. To take the latest example, there was not much difficulty in raising the £10,000 required for the Livesey Memorial Fund. But it is difficult to secure any large amount of support for schemes of a general or indefinite character, such as special purposes, research, &c.

The existing resources of many gas undertakings are no more than equal to the present rates of increase; and the effect of a decided advance in this direction would be large and far spreading, affecting the capital expenditure and the whole of the working operations. Suppose, for example, that the established 3 to 5 per cent. increase is trebled or quadrupled. It means a proportionate increase in the issue of new capital, and a large addition to the labours of the technical staff. The additions previously spread over three or four years must now be brought within the limits of a single twelvemonth. The staff are fully occupied, and extensions in plant are regarded as a sort of stop-gap to be carried on in connection with the regular operations. There is yet an impression in some quarters that gas engineers have a slack season in each year, which leaves ample leisure for repairs and enlargements. This applies with still greater force to the show-room and outside departments generally. Gas shares and debentures go off readily at good prices; but is the market capable of absorbing three to four times the present output? In other words, will the present values be maintained? As regards the manager and his staff, it is obvious that if they are already fully occupied, or nearly so, with the regular daily operations, they can only undertake a limited amount of extension work, while doing justice to both departments. Particularly is this the case in small works where the manager is of necessity personally responsible for a large amount of detail work, and has no assistants or draughtsmen; and instances could be quoted of extravagant outlay and overloading of capital, due to the lack of foresight and adequate supervision in carrying out extensions, or to having too many irons in the fire at one time. One can also understand that a well-planned system of advertising would bring in a large number of inquiries, applications for estimates, and firm orders that would expect prompt attention. I am not urging that this new state of things is undesirable, as presenting unsurmountable difficulties. On the contrary, it would be a benefit in many ways to all concerned. But I do say it is folly to go in for an active publicity campaign, without first making proper provision in every department, for meeting the altered conditions that will follow. If any board of directors is led to the conclusion that the subscription to the Publicity Committee is a first and final payment, that will mean an improved position, and larger or more secure profits without further outlay or exertion, I pity the manager and the staff. It may be difficult to get the subscription in the first place; but it will be more difficult to get the adequate increase in the staff, and perhaps in respect to capital, that may be expected to be rendered necessary. The subscription must be accepted as the first item in a new expenditure account, and not as a total.

There should also be a recognition of the fact that increased publicity must mean increased distribution charges. Sometimes we encounter a disposition to ride the comparison hobby too far. Circumstances differ so much, even in neighbouring undertakings of about equal size, that an advantage of 1d. or 2d. per 1000 cubic feet in the matter of manufacture or distribution, does not necessarily mean better or more skilful management. It is quite possible that a liberal outlay on distribution is money well spent, and that a more efficient service is better appreciated than a reduction in the price of gas. There need be no misgiving on this point, because the position was never more favourable than at present, and there is no difficulty in earning full dividends. The general experience over the past ten years has been a marked rise in distribution charges. The extra staff necessitated by the slot department, and incidentally in connection with inspection and maintenance of apparatus on hire, to say nothing of increased attention to inquiry or complaint, is represented by another 2d. or 3d. per 1000 cubic feet, and this has been met, not only without any charge on consumers, but concurrently with reductions in price. The increased cost of distribution, and the reduced price, have been covered by improvements in the retort-house, such as generator furnaces and conveying machinery. Without these, there must have been advanced prices, or lower profits. The finality in this direction is by no means exhausted, and the manufacturing department can be depended upon to assist the distribution to the extent of another 1d. or 2d. per 1000 cubic feet if necessary.

One argument in favour of the publicity scheme is that electricians have found it necessary to subscribe £50,000 for a similar one, and are satisfied with the result. But gas and electricity do not stand on the same platform; and a policy that is successful for one is not necessarily bound to prove so for the other. I do not know, at the moment, what the increased sales of electricity over the last twelvemonths may be, but would question whether it is a larger percentage than that shown for gas, notwithstanding the assistance of the Publicity Committee. And, further, it is open to question, how much of the increase can be fairly attributed to the exertions of the Committee, and how much to special concessions, liberal terms of installation, &c. The terms on which business is obtained and conducted are very different; and gas companies are regarded as permanent institutions, whereas many electricity

undertakings are established in the hope and prospect of being eventually taken over by the municipal authority.

We have also been reminded that the labours of the Electricity Committee include the vilification of gas in every possible way, and that self-defence requires a counter-action. This is no new line, but has already been tried for all it is worth, and dropped in some cases as an undignified and useless policy. No line of business is assisted by bespattering mud on its competitors, and any violent attack upon gas is not without influence as an indirect advertisement. The public do not believe all they are told, and are apt to think that there must be something in favour of the vituperated article, or so much trouble would not be taken in the way of abusing it. An ordinary tradesman would not think of taking exception to anything short of direct slander or libel, and it is to be hoped the Publicity Committee will not play into the hands of their competitor by being drawn into a paper warfare, which tends more to loss of dignity than to promotion of business. By all means inform and educate present and prospective consumers of gas in every possible way. Good work in this direction has been done in the past, and there is room for considerable extension and widening of the lines already adopted. But any attempt to issue a specific counterblast to innuendos and hostile statements will do very little good. A dignified silence is preferable. Slander and vituperation have something of the properties of the boomerang, and are very apt to return upon the thrower. They can safely be neglected as unworthy of notice. Gas has already been belittled and vilified by electricians in every possible way—and the public have used more and more of it every year.

Advertising is useful as a means of making a place for a new speciality, of which a dozen or even twenty exactly similar lines are already on the market, and for selling articles that could not be disposed of without its aid. It creates a place that previously had no existence. As a consequence, more space is occupied in our daily papers by a record of the virtues and merits of particular brands of whisky, tobacco, and pills, than is available for parliamentary intelligence. But the gas undertaking does not have to cut prices in competition with a dozen or twenty brands of coal gas, the makers of which possess equal facilities in the matter of manufacturing and distributing costs. It enjoys, to a limited degree, a monopoly; and therefore the lines of advertising that are necessary to sell pills or whisky do not apply. And the first object is, or should be, to keep existing business. The getting of new business should never be allowed to take the front place. The business in some of the specialities instanced may depend on the skill of the advertising agent, and there may be a direct connection between the advertising and the sales. But nothing of the sort obtains in the case of gas, to which advertising may be a desirable adjunct, but not a vital necessity. There are yet many gas undertakings that have developed good business and earned full dividends for years, but have never done anything in the way of publicity as the word is now understood. Publicity is good, but is not absolutely the one and the only thing needful.

Of the many important developments of business that have been attained without any aid in the direction of modern methods of advertising, we may consider two lines that have come within our own experience, within the last twenty years. I refer to cookers and to automatic meters. What are the chief causes that have brought these up to such large proportions. To-day, there are two cookers to every three consumers, and 250 or 300 out of every 1000 cubic feet of gas sold now goes through an automatic meter. Perhaps the growth of these departments might have been more rapid; but as they stand, they make a very respectable showing. Judging from the actual experience, the most powerful factors in getting new business are not snappy or catchy paragraphs in the papers, glaring posters, or attractive literature, but a liberal policy that relieves the customer from any initial outlay for fittings, and at the same time protects him from the evils due to small pipes or unsuitable appliances; and more than that, there is free maintenance. The undertakers not only provide the appliances in the first place, but also accept responsibility for keeping them in going order. There is also every facility for instruction as to the proper usage, either in the form of personal explanation to the individual at the show-room or at his own residence, or through the medium of public demonstrations, lectures, and exhibitions. The work thus accomplished might have been assisted by advertising; but without the facilities just mentioned the bare advertisement would be of no use. Would it have been possible, by advertising alone, to banish the dangerous water-slide pendant from the South London district? No progress worth the name could be made by selling apparatus at cost or by deferred payment or hire-purchase. The real move began with the plan of supplying at an inclusive annual rental, with no extra charge for fixing, or for renewal when necessary, which meant free fitting and free maintenance, a proper supply, &c., in the first place, and no expense for repairs afterwards.

The public appreciate these privileges so highly, that trouble on account of careless usage or wanton injury to the apparatus is rarely experienced. But even with these advantages, a periodical inspection is sometimes found to be desirable, as people will not be at the trouble of notifying the gas office in the case of a slight difficulty, that may interfere with the regular or entire use of the apparatus. There are a few consumers who would take to the automatic meter as a matter of preference; but it would never have been placed out in numbers approaching or even exceeding the ordinary meters, without freedom from initial cost and from full responsibility right up to the burner. Of all advertising or educative methods, there is nothing that approaches an efficiently carried out installation of a cooker, a set of slot fittings, or any other appliance. The customer may perhaps read an advertisement or poster. He may (yet more doubtful) read a leaflet or pamphlet set out on attractive popular lines, which are scarcely complimentary to popular taste as ordinarily understood. But efficient lighting, warming, or cooking is always with him, and he cannot get away from them. He becomes to a limited extent, perhaps, an advertising agent for the company.

Unfortunately, the converse is also true, and the greatest difficulty that gas has to encounter to-day is the use of old-fashioned antiquated pipes and fittings unsuited to modern conditions of consumption, sometimes combined with irregular and variable supply pressure. In very many instances, the installation that was put in 50 years or more ago is retained in use. None too skilfully designed or laid down in the first place, it has not been improved by irresponsible alteration, patching, and botching from time to time. The user knows the position of affairs, but does not consider it his place to provide new pipes, and the owner will not. And so the thing drifts, trouble or defect from the naturally accumulating defects of years, being all blamed to gas or the gas company. If the suppliers of gas are indifferent to this matter, the electricity canvasser is keenly alive to it, for in this direction lays his best harvest ground. People who have been worried by dim, unsteady lights, or insufficient supply, are easily induced to try a change without any inconvenient inquiry as to cost. The brand new free wiring installation appears quite satisfactory, and the canvasser forgets to explain that the improvement is really chiefly attributable to the modern and up-to-date fit up in place of worn and antiquated material, and not to any special inherent advantage possessed by electricity as compared with gas. Give every consumer a properly designed and arranged set of pipes and fittings, together with uniform pressure at the inlet of the meter, and more will be done to advance the industry than is possible by any amount of publicity.

Gas companies have not laid themselves out to secure the interest and co-operation of architects, builders, and others who may be in a position to introduce new business; nor is there, as a rule, any special personal enthusiasm on this point among the directors and the staff. Things are very different in the electricity company. The whole body, from the chairman down to the messenger boy, are imbued with the necessity for pushing their commodity at all times and seasons. The majority on the gas-works staff have never drummed up a new customer since the time that they joined the company. What is the result of these different practices? Take, for example, a £20 per annum villa. If fitted for gas, there will perhaps be two points in the front sitting-room, one in the back, and one each in the kitchen and passage. If wired for electricity, there will be about twenty points. A cluster of three in the front room, two each in the back sitting room and best bed-room, three or four on passages and landing, and one in every other room. And if the tenant should express a preference for gas, he will find every possible objection raised, and be given to understand that the landlord would prefer him to use electricity.

In the face of these difficulties, the incandescent burner, the gas-fire, and the cooker more than hold their own. If only the hindrances could be removed, an unprecedented increase in sales is bound to follow.

Edinburgh and Leith Gas Commission.

The annual accounts of the Edinburgh and Leith Gas Commission, which were submitted to the Commissioners, at their meeting yesterday, by the Treasurer (Mr. A. Canning Williams), show gross profit amounting to £115,874, which is £9486 less than for the previous year, accounted for by the reductions in the price of gas. The quantity sold was 2·39 per cent. less, but 1·78 per cent. more than two years ago. After deducting £31,888 for annuities, £40,057 for mortgage interest and expenses, and £30,181 contributions to the sinking fund, there remains a surplus of £5748. During the year the capital debt was reduced by £49,871. This was accomplished as the result of the discontinuance of the system of investing sinking-fund moneys in outside securities.

Protection of Service-Pipes from Electrolysis.—In order to protect their service-pipes from electrolysis, the Laclede Gas Company, of St. Louis, are covering their wrought-iron piping with layers of pitch and paper; and the method seems to be proving successful. The wrought-iron pipe is first coated with a tar and pitch mixture, heated and thinned sufficiently to flow easily; and on to this a 4-inch paper ribbon is wrapped spirally, its edges overlapping. The paper covering is then tar-painted and again wrapped with paper; the process being repeated till four successive coats of tar and paper have been applied. Pieces of pipe thus insulated have been placed in the ground under conditions distinctly favourable to electrolysis, together with other lengths not so treated; and after being taken up at the end of two years, the unprotected pipes were badly pitted and almost completely destroyed, while the insulated piping was virtually in the same condition as when laid. It is believed that pipes so treated will have their life at least doubled. Only service-pipes are being treated; the cast-iron mains being less subject to corrosion and electrolysis. The tar and paper coating is very hard when cooled, and the lengths of pipe do not need to be handled with any more care than bare pipe.

CONTINUOUS CARBONIZATION.

[COMMUNICATED.]

THERE are so many substantial advantages in this method of working, that the day cannot be far ahead when it will become the system *par excellence*. No experienced carbonizer can gainsay the fact that to produce gas of uniform quality from each retort throughout any one day is an advantage the importance of which cannot be belittled. In these days of the predominance of the inverted burner and the universally acknowledged importance of the uniformity of the gas both in the matter of pressure, density, and calorific power, it is a great consideration that the system of working should be one which lends itself to the production of a uniform quality.

No one can fail to be impressed with the regularity of the calorific value of the gas produced in continuous carbonization, as was shown in the reproduction of the charts in Mr. J. G. Newbigging's paper, read at the Glasgow meeting of the Institution of Gas Engineers. It is ideal. No supporter of the system of horizontal retort carbonization could show anything like it. With a continuous system, it is obvious that present in the retort at all times there must be coal in all stages of distillation—some nearly spent, some half-distilled, and some at the top of the retort producing rich gas. What conditions of carbonizing could be better? It stands to reason that so long as the mechanism of charging the coal and withdrawing the coke are in working order, nothing can prevent the production of a uniform quality, showing but little variation from hour to hour. The importance of uniformity cannot be too much emphasized. It is reasonable to suppose (though little on the matter has been published) that, given uniform calorific value, the density of the gas will vary to a very small degree. The other consideration to consumers—the question of distribution pressure—is well under control; and it is given to every engineer to maintain a regular pressure, should he deem it necessary.

With continuous carbonizing, we come to another advantage. It is in the entire absence of smoke and flame from charging operations, and dust and steam from the quenching of coke. Many gas engineers have had anxious days and hours trying to minimize as far as possible the production of nuisance in the retort-house. Especially is this the case in residential neighbourhoods, where people are not slow to complain whenever the wind is in their direction, and carries with it the inevitable smoke from the charging of retorts.

The experimental—for it can be called nothing else—Glover-West installation of the Manchester Corporation, to make 500,000 cubic feet per diem, is not only of value to the owners of the plant, but also to scores of small and medium-sized undertakings making some 150 million cubic feet of gas per annum, and who have been wavering for the past year or so as to the advisability or otherwise of installing machinery for horizontal retorts. Mr. Newbigging shows the way; and it does not take a very bold man to follow his lead. Reading the paper, and reading between the lines, the impression is given that things have gone well with the installation during its year of trial. All engineers when installing new plant, and especially when it is to some extent pioneer work, are prepared for difficulties and troubles; but no mention is made of these in Mr. Newbigging's paper. It is noticed that the bench, consisting of two settings of eight retorts each, may be most conveniently divided into four units, as each retort-setting is divided into two sections of four retorts each, either or both of which may be worked at one time. This makes the system particularly suitable for small works, as, assuming that the bench makes 560,000 cubic feet of gas a day when fully at work, it may be varied at will to make 420,000, 280,000, and 140,000 cubic feet per diem, as occasion demands and as the seasons change, by simply shutting-down or picking-up a half-set at a time. This is an advantage which will be appreciated.

One cannot fail to be impressed with a substantial advantage that the continuous vertical retort system has over the intermittent; and that is in the matter of pressure in the retort. The coal being continually on the move, must obviously be automatically and regularly opening-up passages for the gas to pass up as soon as produced. This action may be likened to the poking of a domestic fire to keep the coal from caking together and closing up the air passages. The advantage of this movement is eloquently shown by Mr. Newbigging's statement that "a level gauge in the whole length of the retort is one of the notable features of this system of carbonization;" and the same statement is made by Mr. Leather in his paper.

These are ideal conditions, and have more bearing on the large make of gas per ton than is generally realized. It is also noteworthy that at Droylsden the gas outlet from each retort producing about 35,000 cubic feet a day is only 7 inches in diameter, whereas many engineers in fitting up horizontal retort settings provide pipes of 8 inches in diameter for a retort producing no more than 16,000 cubic feet a day.

In this connection, too, it is significant that at Burnley for retorts producing about the same quantity of gas as those at Droylsden the gas off-take pipe is no larger than 4 inches in diameter, though Mr. Leather remarks that the pipe should be somewhat larger, adding the information that in the Woodall-Duckham installation at Lausanne the pipes are 5 inches in diameter. This matter is interesting in that it shows horizontal-retort carbonizers that the difficulties of stopped pipes are quite cured in the continuously worked verticals. This view is emphasized when it is considered that were ascension pipes in horizontal retorts fitted on the same scale as the off-take pipe in the Burnley installation, a 22 inch by 15 inch by 20 feet through retort would be provided with a single ascension pipe $2\frac{7}{8}$ inches in diameter.

There is no doubt that the system of heating the retorts, and the use of the hot coke to heat the secondary air has been particularly well thought-out in the Glover-West system, with the result that these retort-settings are notably economical in the matter of fuel. It was a most ingenious idea to utilize the waste heat of the coke in this manner; and there is no doubt that this arrangement materially aids the prevention of those mechanical difficulties which practical men associate with the continuous extraction of hot coke from a vertical retort.

The labour costs in the Droylsden installation are very low, being actually no more than 4d. per ton of coal carbonized. The plant being on a small scale, is not provided with coke-handling machinery; so that it may be safely assumed that in a larger retort-house the labour costs would hardly exceed 3d. per ton, or even lower, as against about 6d. with the most up-to-date installation of horizontal retorts. In the case of the latter, a small retort-house fitted with machinery to deal with 45 tons of coal per diem, as is Mr. Newbigging's retort-house at Droylsden, could not well be worked under a cost of about 14d. per ton of coal (allowing for the removal of the coke by hand) as against 4d. with the Glover-West vertical settings. It is unfortunate that Mr. Leather did not give details of his labour costs; it is a matter of considerable importance, and should not have been omitted.

Tests at Droylsden are truly astonishing, especially in the matter of make of gas per ton. It will be seen that with both Yorkshire and Derbyshire coals, well over 14,200 cubic feet of gas per ton was made, of the quality supplied in London at the present time. The illuminating power (No. 2 "Metropolitan" burner) was 15·3 candles in each case; and the analysis shows that the gas was good and by no means over-loaded with diluents. Such figures as these, coupled with the low labour costs, low fuel account, good yield of tar and ammonia, uniform quality of gas produced, the entire absence of nuisance—and taking into account the moderate (under the circumstances) initial outlay—make the adoption of the continuous system highly desirable.

But as several speakers pointed out, there is no need to scrap up-to-date installations of horizontal retorts. The system is essentially applicable to cases where new retort-houses are required; and it does not take a very bold prophet to foretell that large numbers of continuously worked verticals will be installed in medium and large retort-houses during the next few years.

Practical men are somewhat sceptical in the matter of quality of coke made in continuous verticals. Their reasoning is that coal continually on the move during the process of carbonization must be greatly affected in the matter of coking. Does it seem feasible that the coke can be as good as that produced in an intermittent vertical retort? The theoretical and the practical man will both say "No," but that they are open to conviction. And this is the position to take up. It needs more than a few pieces of coke displayed on a table to carry conviction. In this respect, it would have been of material assistance if figures had been given as to the relative proportions of dust, small, and large coke passed through screens of various meshes. Mr. Newbigging states that it will be "readily gathered from an inspection of the samples which have been sent from Droylsden, that there is a general improvement in its condition and appearance—being clean and bright, and free from dirt and semi-carbonized portions such as are found in coke from horizontal or inclined retorts." One could not assume from the samples—excellent though they were—that there was a general improvement in the coke; nor could one readily gather the same information from an inspection of a few pieces. Unfortunately, Mr. Leather entirely omits the question of the quality of the coke and the proportions of large, small, and dust, though a perusal of his paper will readily convince the reader that had there been anything to say in depreciation of the coke we should have heard it. It is a thousand pities that from the nature of the installation of Woodall-Duckham retorts at Burnley, it was impossible to give all the important figures as regards make and quality of gas, tar, and ammonia. But figures regarding the make and sale of coke and breeze of various sizes, the fuel account, labour costs, and capital cost of the plant, which apparently could have been given, were all omitted. The paper was, nevertheless, a most useful one, though it was of the nature of a candid criticism of the Woodall-Duckham settings as now installed at Burnley, and dealt entirely with the working details of the settings.

Then in the matter of capital cost, the vertical retort-settings are considerably more expensive than horizontal retort-settings, and the results must perforce be much superior to those obtained with horizontal retort-settings "to make the game at all worth the candle." Several of the speakers were sceptical on this point; and it must be acknowledged that there is a big difference in the initial outlay. At Droylsden, the cost was £180 per ton of coal, and at Burnley a little under this figure. But Mr. Leather makes the important qualification that had the retort-house been built especially for vertical retorts, the cost would have been about £140. This figure also closely approximates to that given by Mr. Moon in the discussion, and by Mr. Holmes Hunt in his paper. Considering that horizontal retort installations cost but very little more than £100 per ton, as was stated by Mr. Holmes Hunt and

endorsed by Mr. Allen, it is assuredly necessary that the saving in working should be sufficiently large to pay the interest on the extra capital laid out, and also a further sum of at least 5 per cent. per annum for the purpose of writing-off the extra money spent on the installation. Assuming that a vertical retort-house is built of a capacity of 250 tons a day, it is not reasonable to suppose that in actual working more than 70,000 tons of coal will be carbonized per annum—taking into consideration the sundry stops made for repairs, and the shutting-down of settings during the summer months. Taking the cost of the plant at £140 per ton, or £40 more than the cost of a horizontal retort plant, interest and sinking fund appropriations on the extra capital outlay of £40 per ton will together amount to £1000 per annum, or equivalent to 3·4d. per ton of coal. The extra capital outlay is therefore no small matter; and many engineers would require convincing proof that the saving would be a large one before expending much capital on a new system of coal carbonization.

There are however so many directions in which continuous carbonization should save money, and in which the conditions of retort-house working are so vastly improved, that the system is bound to grow in popularity.

THE INSTITUTION CARBONIZATION PAPERS.

An Addition to the Discussion on Mr. Holmes Hunt's Paper.

Mr. J. G. Newbigging, of Manchester, forwards a copy of the remarks that he intended to have made during the discussion on Mr. Holmes Hunt's Institution paper, had there been time. They are as follows.

One feels some diffidence in discussing a paper in the absence of the author; but as Mr. Hunt, on visiting England last year, had the permission of the Manchester Corporation Gas Committee to make trial tests with Australian coal in the vertical retorts at Droylsden, I was naturally interested to know the reason of his final choice of the Dessau intermittent system.

In common justice to the particular continuous system at work in Manchester, I must point out that, owing to the small quantity of coal sent to that works (37 tons), the trial was abortive; it being quite impossible to adjust the plant to the particular conditions necessary to efficiently deal with the coal before the supply was exhausted.

In view of the unique opportunity Mr. Hunt had of investigating various carbonizing systems, and the great amount of time he devoted to it, I looked for some stronger reasons than I have been able to discover in his paper to justify his final choice. He speaks of the continuous system as being still in its experimental stage, which is not in accord with facts. Mr. Hunt's decision seems to have been influenced by the following reasons:

1. Higher sperm value obtainable with Dessau verticals.
2. Improved coke.
3. Lesser labour costs.
4. Complete absence of machinery.

Taking the first point. So far as my experience goes, there is no justification to assume that a higher sperm value can be obtained with the intermittent than with the continuous system of verticals. There is, on the other hand, every reason to expect that the latter system will give the best results in this respect, owing to the absolute control of the speed of the coal passing through the retorts to suit the varying qualities used.

With regard to improved coke, that made by the continuous system is, in my experience, superior to that made by the intermittent system, inasmuch as it is not, with the majority of coals, quite so dense, and will therefore be more suitable to the general body of consumers. It is, in fact, a coke with respect to density coming midway between the softer coke produced in horizontals and inclines and that produced in intermittently charged verticals. In the case of the intermittently charged verticals, the coke is certainly larger; but I have yet to learn that large pieces of coke burn satisfactorily in the majority of uses to which it is put.

The ideal coke is that which is graded to a suitable size for the particular use required. All up-to-date gas undertakings are equipping their works with coke breaking, screening, and washing plants; and it is in this direction that we must look for a larger revenue derivable from our most important residual, rather than increasing its size. The belief in large coke is merely sentimental; so that unless a system of carbonizing produces an undue amount of coke capable of being passed through a ½-inch screen, actually riddled, it is just as good a system, as far as the production of coke is concerned, as one producing very large coke.

I do not agree with Mr. Hunt's conclusions that even a small percentage of moisture in coke is of no consequence. Our object should be to sell it as dry as possible, if we wish to increase the sale. Neither do I agree that the measure of the fuel used is the quantity of coke sold per ton of coal carbonized. That is all a question of moisture contained in the coke sold; and it is quite possible that a gas undertaking selling 9 cwt. of coke per ton of coal carbonized is doing better work in this direction than one selling 10 or 11 cwt.

With regard to working costs, it is inconceivable to me that any body of workmen would agree to work in a vertical retort-house on the intermittent system with the same number of men or rate of pay as with a continuous system. In the former case, the men are exposed to heat, smoke, sulphur fumes, and dust—exhausting conditions entirely absent from the continuous system.

The fair and proper measure of working costs, when comparing one system with another, is the amount of manual labour required to be done, and the conditions under which such labour is performed, because the regulations concerning labour may be quite different in one district to another. In one town, for instance, it may be possible to have two twelve-hour shifts, and in another labour regulations may necessitate three eight-hour shifts. But apart from this phase of the question, the only available information regarding the costs of working in this country do not bear out Mr. Hunt's assertion that intermittent vertical retorts can be worked more cheaply than continuous verticals. On the contrary, they entirely contradict his contention.

The last point, "absence of machinery," is hardly worth dwelling on, as the simple and slow-moving machinery necessary in the continuous system is analagous in its simplicity to the hydraulic power required to operate the bottom mouthpieces of intermittent verticals. So far as the coke-extracting mechanism at Droylsden is concerned, it has never given a moment's trouble.

On one question I find myself in entire agreement with Mr. Hunt; and that is the unsuitability of chamber-ovens for the production of illuminating gas. I have long held the opinions he expressed with regard to this method of distilling coal for the production of gas.

The Working Temperature of the Manchester Verticals.

A correspondent who is "much interested in the latest carbonizing systems, and desirous of knowing as much as possible about them," repeats the request made by Mr. Ferguson Bell to Mr. Newbigging during the discussion, to give the temperature at which he works his vertical-retort plant at Manchester. As both Mr. Drury and Mr. Leather gave this information in regard to their respective plants, particulars of Mr. Newbigging's temperatures would, our correspondent adds, be especially interesting.

The Papers from "The Times" Point of View.

Last Wednesday "The Times" wrote: It is satisfactory to be able to record that the Glasgow meeting of the Institution of Gas Engineers was successful in bringing together the results of recent experience in carbonizing systems and installations from localities so widely separated as Melbourne, Burnley, Manchester, and Sunderland. In making deductions from these results, it is necessary to keep clearly in mind the differences in the quality of the coal used in the various tests, and the differences in the local conditions that determine the relative efficiencies of the methods. The figures contained in the papers [abstracts of which are given] are of the utmost value; and they will serve to stimulate investigation in the direction of scientific accuracy. It has reluctantly to be confessed that the methods employed in gas manufacturing have too often been characterized by the crudeness to which Mr. Newbigging referred; and that the whole art and craft has suffered from loose definitions and from imperfect systems of measurement. The very word "bituminous" applied to coal by some of the speakers, and completely justified now by usage, is a relic of an undiscriminating age. On the other hand, it would be unjust to compare the process of gas making with the process of generating electricity, in respect to measurements. Gas manufacturers have had to encounter in their measurements difficulties incomparably greater than those of their competitors in the lighting and power industry; and the apparent crudeness is often the consequence not of unscientific methods but of inherent differences in regard to raw material. This truth comes home to every works overseer who seeks to compare the calorimeter value of a consignment of coal with the value determined by a bulk test of a truck-load under the boilers.

Annual Meeting of the Italian Gas and Water Association.

This year's gathering of the Italian Association will be held from Sept. 7 to 15, and will be unique in this respect, that for the first four days, the meeting will take place at Turin, while the second part will be at Rome and extend from Sept. 13 to 15 inclusive. The object of this arrangement is to enable members to see both the exhibitions at Turin and Rome, which, it will be called to mind, are being held to commemorate the fiftieth anniversary of the declaration of Rome as the capital city of the kingdom of Italy. At Turin visits will be paid to the gas-works of the "Società Italiana per il Gas" and of the "Società Consumatori Gas-Luce." The meeting there will be adjourned on Sept. 10; and the two following days will be free for members to travel, as they please, to Rome, where, on Sept. 13, an inspection will be made of the gas and electricity works outside Porta S. Paolo. In both cities, the municipal authorities will give receptions to the members; and the general programme promises well for a profitable and successful meeting. The President is Sig. C. Pouchain, and the Secretary is Sig. L. G. Maggioni, the Manager of the Gas-Works at Modena.

Masonic.—Mr. H. W. Packham, of Kingston-on-Thames, has been appointed Provincial Grand Deacon for Surrey, and was duly invested at the recent meeting of the Provincial Grand Lodge.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

Some Points from the Discussions.

Succeeding pages of to-day's "JOURNAL" contain abstract translations of practically the whole of the remaining papers presented at the recent congress of the Société Technique du Gaz en France. Before leaving the subject, it may be of interest to give, very briefly, a few of the remarks to which some of the papers gave rise.

One of the questions put down for discussion was the manufacturing processes and mechanical appliances in use in small and medium-sized gas-works carbonizing from 3000 to 10,000 tons of coal per annum. It was preceded by the paper submitted by M. Léon Visinet, a translation of which appeared in the "JOURNAL" for the 30th ult. (p. 604). After the author had given some details of the machine described in the paper, M. Lacaze alluded to an installation made by his Company (the Compagnie Continentale pour la Fabrication des Compteurs) some ten years ago in a manufactory of electric lamps at Ivry. He furnished some interesting particulars in regard to a machine recently constructed by the Company, and erected in the gas-works at Rambouillet. The installation comprises a small conveyor; and the scoop is turned automatically at the end of its passage into the retort. M. Lacaze reckoned that a similar installation for four settings, with elevator, coal-bin, coke-screen, conveyor, &c., would cost about £1000. M. Bachelay, who has used the Dunkel machines in the Toulon Gas-Works, remarked that there was no need to fear injury to the retort, as a butt was provided to stop the scoop, which, being divided, leaves a furrow in the middle of the charge, whereby the escape of the gas is assisted, and the passage of the pricking-iron facilitated after the charge has been withdrawn. The speaker added that the question of discharging the retort had not been overlooked; and certain trials he had made led him to believe that the machine could be arranged for this operation. In answer to M. Godinet, M. Lacaze said the normal charge was 195 kilos. (430 lbs.).

The communication of M. Laurain on "Tar Condensation in Paris Gas-Works," contained in the same number of the "JOURNAL" (p. 602), gave rise to a general discussion, in the course of which M. Grebel reminded the members that at the congress in Paris last year he called attention to the fact that the tar and the greater portion of the naphthalene in gas were now condensed hot. This process was diametrically opposed to the one which M. Laurain had brought before them. In most gas-works, the practice is progressive hot condensation. If only the removal of the naphthalene was aimed at, if gas of a high illuminating or calorific power was not desired, and if the other processes employed had not produced satisfactory results, then sudden cooling might be tried, but without going so far as to use ice machines, as had lately been proposed. M. Grebel said he was desirous that it should not be supposed abroad that the system of condensation in use by the Paris Gas Company was that adopted by all French gas managers, because it would very shortly be in direct opposition to the processes of condensation at high temperature necessitated by the direct saturation of the ammonia. M. Sainte-Claire Deville was at one time a partisan of slow, progressive condensation. The results he had obtained with regard to the quantities of benzol retained in the tar were of no value except for the gas-works at La Villette. The quantity of benzol lost would in some cases be much more than 2 grammes. At Gennevilliers, hot condensation had been given up, with a resulting loss of 7 to 8 litres in illuminating power, while M. Sainte-Claire Deville spoke of only 2 to 3 litres.

M. Laurain, referring to the objection raised by M. Grebel, that the new process appeared to be in opposition to the experiments carried out abroad, said in his paper he only dealt with the actual question; and he qualified as an error the accessory fact of retaining 2 grammes of benzol and not doing what was necessary to suppress the naphthalene. M. Guillet said he had installed at Clermont-Ferrand condensation plant in accordance with the principles laid down by M. Laurain; and he noticed with satisfaction that there was now no longer any naphthalene at the outlet of the Pelouze and Audouin condenser, where it was formerly found. M. Sainte-Claire Deville remarked that the objection raised by M. Grebel gave rise to a number of complex questions. He had given M. Raoul Frère, the Manager of the works at Gennevilliers, a very clear explanation of what went on there. With regard to the photometer tests of the gas passing through the hot condensers, it was charged with the benzol in the tar contained in these vessels. M. Grebel observed that M. Sainte-Claire Deville reversed the order of the experiments. At Gennevilliers the gas was tested with the condensers at work; then they were thrown out of use, and after some hours it was found that the illuminating power of the gas had fallen to the extent of 7 to 8 litres. The explanation given was not admissible. M. Masse (the Engineer of the Gennevilliers works) said the subject was still under consideration, and therefore it would be premature to make any definite statement in regard to it. He would reserve for a communication at next year's congress any further observations on the Gennevilliers results.

The President (M. Marquisan) thanked the speakers for their remarks, which he said had broadened the question under discussion. He emphasized the fact that quick condensation was making headway abroad, especially in England and Germany. M. Cornuault alluded to the importance of the work done by M. Sainte-Claire Deville; but he called to mind a communication on the subject of condensation by M. Emile Coze, the views enunciated in which were altogether opposed to those of M. Sainte-Claire Deville. His confidence in their learned colleague, however, had caused him to become a partisan of the new theories of quick condensation at low temperatures.

In the "JOURNAL" for the 13th inst., an abstract was given of the paper submitted by M. Bonnet, in which he analyzed the reports made by the experts on the subject of the Hamburg gasholder accident. M. Godinet emphasized the importance of the communication; and M. Mallet profited by the presence of M. Bonnet to ask him if he was aware that gasholder plates of 18 kilos (40 lbs.) per square metre (10·75 square feet) had been employed. M. Bonnet replied that he was not; but, speaking personally, he considered that it was not practicable to use steel plates of more than 10 to 12 kilos (22 to 26½ lbs.) per square metre.

Miscellaneous Papers.

Other papers on the programme comprised one by M. Bertin, on a new gas-boiler with quick circulation for central heating by hot water, brought out by the Société Française de Chaleur et Lumière; and another by M. Gireaux, on the "J.B." radiator. M. Bergner brought under the notice of the members the lighting of the Boulevard Raspail, Paris, by Graetzin high-pressure lamps, particulars of which were given in the "JOURNAL" for the 28th of March (p. 910); and M. Charles Rouveure dealt with the use of coal oils for driving internal combustion engines. M. Aubert submitted a short paper on the "Fafnir" gas-engine, one of which, of 2 H.P., was, we believe, in use in connection with the gas-compressing plant in the grounds of the Brussels Exhibition; and M. Sost described a safety apparatus for the automatic closing of gas-pipes.

FLUCTUATIONS IN GAS MANUFACTURE.

A paper on a type of regenerative furnace, contributed by M. Defoy to the Société Technique du Gaz, has already been given in the "JOURNAL." The author read a second paper, "On the Variations in Volume of Gas Given Off during Carbonization." Such a subject has more than once been the matter of inquiry and investigation, and more schemes than one have been devised to equalize as far as possible the output of gas from retorts.

M. Defoy directs his attention first of all to the geometric expression of these variations, and then proceeds to examine which arrangement of horizontal settings of retorts is best for equalizing the output of gas; coming to the conclusion that settings of eight retorts, arranged in four tiers of two each, are the most satisfactory for this purpose. He next considers the fluctuations of production mathematically—taking as a basis the indicator diagrams at the pressure side of the exhauster, and applying the general laws as to the flow of gases through the subsequent apparatus offering different resistances. Finally, he regards the consequences of these oscillations in gas making, and suggests the advisability of apparatus like washers and scrubbers being made so as to be adjustable to the varying volumes of gas passing, as are the tar-extractors and exhausters.

The giving-off of gas, the author of the paper says, is affected by continuous variations inherent in the process of carbonization with intermittent charges, which is the most general method. The curve representing this gas production is the geometric result of the ends of innumerable lines placed together, and starting from the same horizontal line of no output, and each measuring the momentary flow of gas at a determined period. A toothed curve of the kind shown is thus obtained, . The teeth occur periodically and indefinitely, at intervals corresponding to the space of time between the charges. If the charges are made at equal intervals, and under identical conditions as to weight and nature of coal, temperature, &c., the curve would be perfectly regular, both as to the space representing the period of time and as to the rise of the tooth representing the volume of gas given off. This law of the expulsion of gas is constant whatever the system or size of the retorts, whether charged by hand with 100 kilos. or modern retort-chambers containing several tons of coal. In a gas-works of given capacity, the diminishing of the interval between the charges in proportion to the diminishing of their size, brings about the diminishing of the fluctuations, and ultimately the production of gas would become absolutely regular for charges infinitely small and infinitely close together—that is to say, a continuous charge.

The principal reason which has led to the transformation of retort-houses in recent years has been the desire to save labour. This is a quite legitimate desire in view of labour difficulties and enactments continuously putting increased burdens on undertakings. The solution adopted could only take the form of mechanical methods of conveying coal and coke, alleviating the hard work of the stoker, and relegating him to secondary work and the control of machines. From this results the tendency to increase the capacity of the retorts and the weight of the charges so as to utilize the mechanical appliances as much as possible. The immediate consequence of this increase of charges is to increase the variations in the volume of gas given off. Moreover,

larger retorts requiring longer time for carbonization, it follows that the time employed in making the charge becomes all but negligible; so that all the retorts become like one chamber of large capacity, charged and drawn in a very short time. This causes the maximum and minimum points of the curve before referred to to be sharper, and therefore to heighten the importance of the fluctuations in the gas made. From all this, it follows that, with a view to reducing these variations, it is advisable to adopt the largest possible number of charges; and, when designing a new retort-house, to ascertain the type of setting which will lend itself best to this result, compatible with the proper utilization of machinery and labour. Such an inquiry will vary with the precise system of retorts adopted; and therefore, in this paper, only horizontal retorts are considered.

A "bench" is a collection of beds served by the same squad, and such that any variations in the volume of gas produced by it are the same as for the whole works. This definition assumes that if there are several benches, they all have the same retorts, and work so that the value of the variations in gas made from each to that of the total gas made is always the same. A "group" is a collection of retorts of the same bench sharing in the same charge. From the preceding, it is obvious that, for a given works and for the same conditions of labour or machines, that retort-setting will be the best which allows of the forming of the largest number of groups corresponding with the number of charges. From this point of view, the author examines three of the more usual forms of settings.

Bed of 8 retorts in 4 horizontal tiers of 2 retorts each.
Bed of 9 retorts in 3 horizontal tiers of 3 retorts each.
Bed of 10 retorts in 5 horizontal tiers of 2 retorts each.

It will be assumed that each retort carbonizes 550 kilos. (nearly 11 cwt.) of coal in eight hours. The groups of each type are practically settled by two considerations—one in regard to the maximum duration of actual work of the staff; and the other as regards the necessity of placing each group of retorts on the same horizontal line. Whatever the process of carbonization, it would be futile to expect from the stoker an increase of his working day because of the less severe nature of his work. It will not do to demand more from him than he did before with direct-fired retort-beds charged by hand—that is to say, about 50 per cent. of actual labour during his presence on the works. Now, the normal duration of a charge on a group of 18 retorts charged with 550 kilos. is half an hour, including accessory operations, such as cleaning the lids and pipes and filling the producers, &c. It seems necessary, therefore, to separate the charges by the interval of an hour. The second consideration arises from the practical necessity of charging and drawing the retorts on one horizontal line. Notwithstanding the adaptability of some machines, it would be waste of time to alter them for different levels in the same charge.

1. *Setting of Eight Retorts in Four Tiers of Two.*—The interval of time separating the charges of the groups of the two top tiers of retorts is $\frac{8}{4} = 2$ hours. Therefore, following on the first consideration, it would be possible to insert one group in the interval, so that the total number of groups in 24 hours would be $4 \times 2 \times 3 = 24$ groups. With 18 retorts and 550 kilos., the maximum power would be $550 \times 18 \times 24 = 237{\cdot}6$ (metric) tons of coal per 24 hours.

2. *Setting of Nine Retorts in Three Tiers of Three.*—The interval of time separating the two top tiers is $\frac{5}{3} = 2$ hrs. 40 min. Inserting one group as before, $3 \times 2 \times 3 = 18$ groups, with a maximum capacity of $550 \times 18 \times 18 = 178{\cdot}2$ (metric) tons.

3. *Setting of Ten Retorts in Five Tiers of Two.*—The interval is $\frac{6}{5} = 1$ hr. 36 min.; and the number of groups $5 \times 3 = 15$ groups, having a capacity of $550 \times 18 \times 15 = 148{\cdot}5$ (metric) tons.

From these results it appears that the setting of eight horizontal retorts allows of the maximum utilization of the staff, as with the same number of men 33 per cent. more coal can be carbonized than with settings of nine retorts, and 60 per cent. more than with settings of ten. Hence more important benches can be built of this type than of the others. A larger number of groups is formed, and consequently it is the best type of the three for regularity in the gas given off. These advantages, in addition to that of less horizontal bulk and more regular heating of the retorts compared to beds of nine, lead to the conclusion that for mechanical working of horizontal retorts settings of eight are the best.

Station-meters are generally provided with apparatus for registering at every moment the volume of gas passing through. But this is done rather from the commercial, than from the technical, point of view; and the diagrams obtained have neither the size nor the form to allow of profitable examination. Moreover, works generally have several meters working at the same time; and it is difficult to conceive of an apparatus totalizing and registering the output of the gas of these meters. However, a sufficiently correct idea of the variable periods of gas production can be arrived at by the aid of the pressure curves on the pressure side of the exhauster. The circulation of gas through the apparatus from the exhauster to the holder is subject to the general law of the flow of gases in a pipe the form and resistance of which is different at every one of its points.

The author proceeds to work out mathematically the formulæ for arriving at these pressures. Being given a pressure curve of an exhauster, to ascertain approximately the variations in the flow of gas at any two moments provided that the pressure is caused by the same gasholder, it is sufficient to read the pressures indicated at the two stated times, to take away the gasholder pressure, and to take out the square root of the ratio of these quantities.

The maximum output of a works referred to in the paper was about 25 per cent. above the minimum, and the average hourly make was 2000 cubic metres. The extent of the make of gas varied from 53,300 to 42,700 cubic metres in 24 hours, when the real make during this time was 48,000 cubic metres. What are the consequences of such variations in a transformed retort-house upon the whole works? It is obvious that if certain apparatus was a little restricted in capacity before the retort-house was altered, it would afterwards be altogether insufficient. Large fluctuations of make may have troublesome consequences. Take the three classes of gas plant. First, the adjustable apparatus—that is, apparatus automatically altered to all the variations of output, such as the exhauster by means of the regulator, and the tar-extracting apparatus like the Pelouze and Audouin, which varies with the fluctuations. The second class includes apparatus that can be regulated by hand according to the work to be done—such as washers and scrubbers, cyanide washers, tar-condensers, &c. In the third category are all the appliances which remain the same whatever the work demanded of them—such as the purifiers and hot-tar condensers.

The first class, if of the maximum power for the maximum make of gas, whatever the variations, is always in good condition for its work. So also the third category. As for the second class, it is impossible to have them proportioned to each instant of change in the make. It is necessary to regulate them once for all according to the maximum output. It follows from this inferiority that the apparatus dealing with bye-products—such as ammonia and cyanide washers—gives a lower degree of concentration. Hence greater difficulties and higher cost in the treatment, and even insufficiency of plant, if the fluctuations of gas are too great. There is, therefore, need to extend to the second class of apparatus the automatic adaptability of the first. As regards the washers, this seems possible with the "Standard" type with variable speeds and flows, by means of suitable regulators. On the other hand, scrubbers or other similar appliances would have to be rejected; their nature not allowing of any adaptability to sharp changes in working.

To sum up, attention has been drawn to the importance of the variations in the volume of gas given off during manufacture under new methods of carbonization, owing to the increase in the charges and the speed of the operations of drawing and charging. The necessity has been shown of adopting for a new retort-house the type of retort-setting which lends itself most readily to the largest number of charges, so as to reduce as far as possible the fluctuations in the make. It has been seen that with horizontal retorts a setting of eight retorts in four horizontal tiers of two seems to show marked superiority over other types. The indications given by the pressure curves of the exhauster have been considered; and it has been shown that the increase in the fluctuations may lead to insufficiency of apparatus and the replacing of some of them. It has also been suggested that it might be advisable, in order to diminish the inconveniences of these fluctuations, to make some apparatus automatic, so that its work may be at every moment in proper proportion to the volume of gas made.

DISTANCE LIGHTING BY THE AUBERT METHOD.

A paper on this subject was read by the patentee (M. Aubert) before the Société Technique du Gaz en France at their recent meeting.

The aim of the inventor of the arrangement about to be described has been to do away with fouling and accidental extinctions. The aperture of the flash-light is adjusted for a supply of gas under a given pressure, and is not alterable—that is to say, the total pressure is applied to the aperture, giving a maximum velocity, and a velocity which may be said to be zero in the tube proper of the flash-light. Choking with dust is thus avoided. The form of the air channel is such that gas in escaping draws in the air, so that, even without a bunsen, a blue flame is obtained. The flame is surmounted by a tiny platinum mantle, which is maintained at a red heat, and thus extinction of the flame by wind is avoided.

In the type "D.D.P.V.," the principle of the apparatus is the employment of two differential bells—one for lighting, the other for extinction—each of which operates the various movements at a given pressure determined in advance. The order of the operations is such that the position of the bells is rendered more stable by the working of the apparatus. Distance lighting is absolutely certain in its action; since it depends only on the supply and on the loss of pressure, and not on the working of the apparatus itself. In other words, the apparatus is one working by central control, depending on the supply-pressure as distinguished from appliances working by excess pressure which are dependent on their special mechanism.

The "D.D.P.V." consists (as shown, p. 1004) of an iron body A B, with an inner casing C, forming a double mercury cup, on which are two movable differential bells, S and I, connected together rigidly by a weight E, connected with H and T. When the two are at rest, the apparatus is closed; when the two rise together, the apparatus is open. The gas enters at D, at the side of which is the pipe U; and when the setting is to "open," it escapes at K L. For lighting, the pressure of gas is

increased, and when it is greater than the action of the weight E on the surface of the small bell S, the two bells rise, and the bell S leaves the mercury, and allows gas to pass to the burner. The gas then exerts its pressure on the large bell I, immediately maintaining the apparatus open.

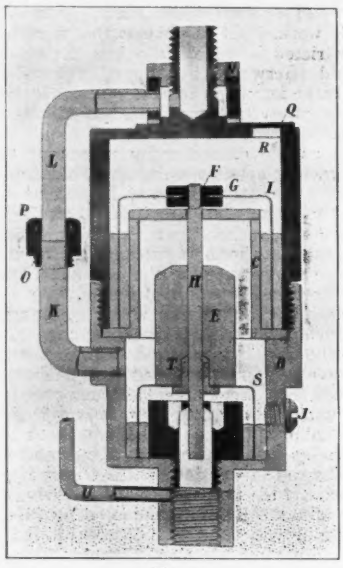


Fig. 1.

The two bells can only descend together when the pressure of the gas is less than the action of the weight E on the surface of the large bell I. The ratio of the two bells is such that this low pressure corresponds with the time of extinction. The two bells descend; the small bell touches the mercury; and the gas is cut off from the burner. But at the same time, the action of the large bell ceases, and the descent of the two together is accelerated. The weight and the ratio of the bells can be determined for any difference of pressure from the ratio 1·2 : 1 to 4 : 1; so that, in practice, the apparatus responds to all conditions. The mercury overflow J allows of ready filling of the apparatus at R.

The apparatus is supplied ready for screwing on the lamp-post; and all that needs to be done is to fill it with mercury. On the suggestion of M. Lhomme, it has been provided with a bye-pass which allows of it being disconnected by hand without being obliged to keep the cock of the bye-pass open and leaving it set for extinction. In order to extinguish by hand, it is only necessary to open the small cap R, and insert a pointed instrument—*e.g.*, a lead pencil.

The "D.D.P.V." may also be used in a semi-automatic way—that is to say, hand manipulation can be employed in conjunction with its automatic action—not casually, but according to a system. One or two examples of such use are given. In the case of mains fitted with the "D.D.P.V." within a certain radius, but not permitting their use to the end of the system, the man in charge of the lighting looks after the non-automatic lamps, using a pole for lighting and extinction. In the case of a system of mains all of which are fitted with "D.D.P.V." apparatus at the time of extinction, and especially at midnight, all the instruments act automatically; the pressure being produced in every part of the mains. On lighting, the radius of action being smaller, the result would be that the lanterns which would be excluded from complete automatic action would be left unlighted within the semi-automatic radius; and these would be lighted by the man in charge, using the hand method.

When lighting by central pneumatic control, "C.C.P.V." is the complementary of the foregoing pressure-difference method. It is designed for distance lighting from the works by means of a pressure-difference apparatus placed at a point on the system where it can still act. The central pneumatic control then provides for the outlying portions of the system or parts where the level makes it impossible to use the "D.D.P.V."

The "C.C.P.V." is based on the following principle: Each lantern lights the next, and so on, from lantern to lantern. For this purpose the lanterns are connected in groups of 200 to 400 by an auxiliary main and provided with a pneumatic relay such that each relay controls the relay following. The result is that a given pneumatic main will only affect two consecutive lanterns; the whole forming a succession of very short mains equal to the distance of two consecutive street-lamps. Such a system should fulfil the following conditions: The use of a single main between street-lamps and this one of small section—the working distance not exceeding that between two lamps; small working pressure—*i.e.*, that of the gas; the usual soundness of the mains is sufficient for this low pressure; leakage is trifling—the main never being under pressure outside the time of disconnection, lighting, and extinction; condensation is without any disturbing effect on the group—transmission of the pressure being constant, in consequence of the small distance between lamps; no part is in movement; any derangement is immediately located between two consecutive lamps; no wear and tear or depreciation; no compression or emission station.

The general arrangement of the system is shown in the diagram. The apparatus is placed in the base of the lamp or in the lantern, screwing under the burner. Each relay includes a small bell, admitting the gas to the burner and at the same time to the next lamp. The small bell is actuated by a large bell, which is operated by the gas passed by the preceding lamp, and so on from one lamp to the next. The system of mains can be constructed of iron or lead pipes, and may be passed through the existing gas-mains—thus avoiding trenching, &c.

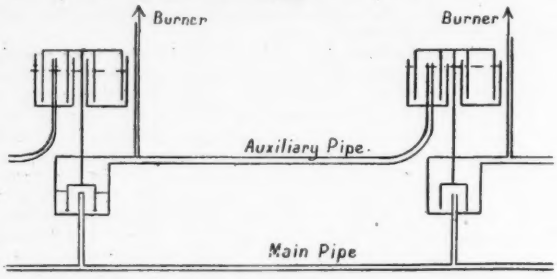


Fig. 2.

It has been found that as a result of the special type of flash-jet the lighting is certain. Moreover, it is so rapid as to appear instantaneous for each group of 200 or 400 lanterns, although it takes place from one to the next. An exact time of lighting and extinction may be maintained, while these times may be modified or repeated under varying conditions—such as fog, moonlight, &c. The system requires no clockwork or setting to time. The apparatus in the lantern is of small dimensions and casts no shadow; while it does not call for the recharging of accumulators, and is further independent of all difference of level in different parts of the mains or of varying pressure of the gas.

DIRECT AND DISTANCE ELECTRIC LIGHTERS FOR INCANDESCENT BURNERS.

This was the title of a paper by M. Ménagé, read at the recent meeting of the Société Technique du Gaz en France.

The principle of the system consists in the use of a central electric battery, the continuous current of which is converted by an "oscillator" into a low-tension current of special character, which passes across interruptors to the parts of the apparatus which utilize it by means of a single wire returning to the battery by the gas-mains. The low-tension current is converted, in the tiny transformers placed underneath each piece of apparatus, into high-tension current suitable for the production of the spark in the lighting devices placed above the mantle. The patterns of the apparatus which effect lighting at a distance are further provided with an electrically controlled cock, the opening and closing bobbins of which are fitted with distinct interruptor press-buttons of different form and colour. The opening bobbin is mounted in tension with the transformer producing the electric spark employed for lighting. The cock is notable in that it includes no part liable to wear and tear or to work loose, while it does not depend on a spring for checking the supply of gas—such checking being ensured by a special construction which allows of the gas being led over the valve so that the pressure of the gas acts in the direction of closing. The greater the pressure, the more perfect is the closing.

The lighting installation includes a fixed battery and oscillator, wire with interrupting buttons for each apparatus, and simple direct or distance lighters to any number required. The battery consists of four dry cells enclosed in a case. Two types of battery are used, according to the size of the installation. They are of the internal cell pattern, thus avoiding deterioration due to heat and damp. The elements may be used for more than two years, and can be employed almost up to the limit of their capacity. They are fitted with bayonet and spring terminals, which allow of their being replaced in a few seconds by an unskilled person.

The oscillator is not a simple vibrator, such as those employed hitherto, but is also an intensifier of the current—the current sent into the transformers being an indirect one produced by the discharge of the self-induction bobbin into a condenser. This indirect current is of considerably greater intensity than the direct current of the battery, since the energy of the charge which has taken an appreciable time to be formed is reproduced in a very short time. The increase of pressure is such that the transformers which furnish a spark of over 10 mm. with the current from the oscillator, give only a very feeble one with the ordinary vibrator. It is this which has allowed of the great reduction in the size of the transformers. Moreover, the presence in the same circuit of a self-induction coil and a reservoir imparts an oscillating character to the current which allows of its resisting, much better than an ordinary current, the effects of damp and grease on the electrodes. Further, a special construction of the oscillator has obviated the use of the electro-magnet, which serves to actuate the armature, and allows of using in its place part of the magnetic effect of the self-inductive bobbin.

The oscillator box (fig. 1) is fitted with three terminals—one, P, is connected to one of the poles of the battery; the second, L, receives the end of the wire; and the third, PM, is double—being connected on one hand to the remaining pole of the battery and on the other to a wire which leads to the gas-mains.

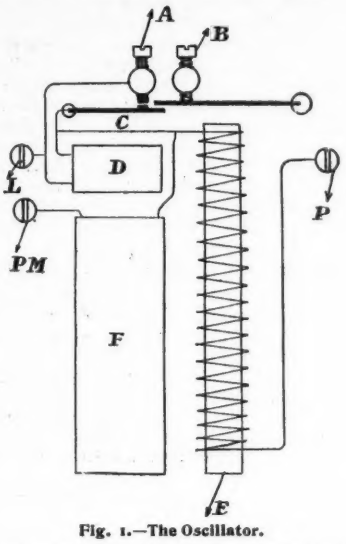


Fig. 1.—The Oscillator.

A. Platinized screw. B. Stop-screw. C. Vibrating plates. D. Small condenser. E. Coil. F. Line condenser.

The connecting electric cable should be installed with much care, since bad insulation gives rise to endless troubles. The author has devised single and double contact switches which are easy to fix, contain no metal screws, and, being constructed of moulded material, are free from defects such as swelling, &c., when wood is used. The double switch, for distance-lighting, includes a white convex press-button for lighting and a black concave button for extinction. The two are thus recognizable by day or night.

The lighter for direct use with upright burners is formed as follows: The cable current, after having traversed the interruptor, reaches the insulated terminal of a small transformer formed by two superposed coils—one of very fine, the other of thick wire—wound round an iron core. The size of this microscopic transformer is that of a cylinder 18 by 18 mm. The case containing it measures only 20 by 20 mm. A metallic rod passes through the axis of the transformer. This serves to fix it on a small board itself placed between the injector of the burner and the union on which the latter is fixed. (See fig. 2.)

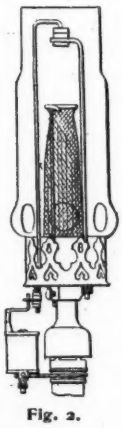


Fig. 2.

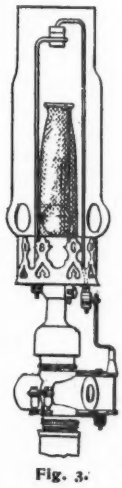


Fig. 3.

The insulated high-tension pole terminates in a milled head carrying a rod which engages in an eye connected to the insulated pole of the lighting switch of the gallery. The gallery supports the lighting switch, held at a certain height above the mantle by two vertical rods, one of which is attached to the apparatus, and the other (insulated) is connected to the eye which serves to make communication with the transformer. This lighting switch is composed of an outside armature of soft steel in which is screwed a small insulating steatite cylinder, into which passes the end of the insulated rod connected with the transformer. The spark passes to the lower part of the switch between the central rod and the outside part.

In the case of inverted burners, the same transformer is used for the production of the spark, with the difference that it is incased in a material indifferent to heat. It can be placed directly above the burner; the lighting switch being located against the burner at a small distance over the mantle. The exact mode of fixing the lighting switch varies with the type of burner. In order to light a burner, the gas-cock is opened on the main, and pressure is applied to the interrupting switch. A stream of sparks passes across the lighting switch, and the gas is immediately lighted.

The apparatus when designed for distance-lighting (see fig. 3) consists of a cylindrical body, the control of the gas in which is produced by means of a metal valve, resting on a metal seat.

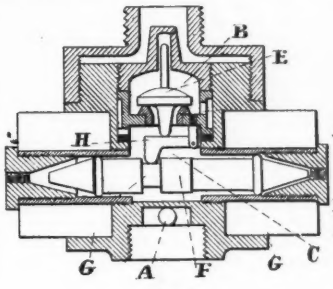


Fig. 4.

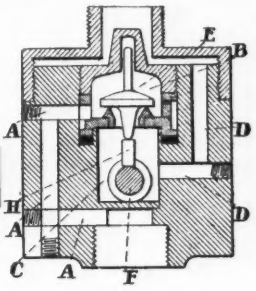


Fig. 5.

A. Gas inlets. B. Upper valve chamber. C. Lower valve chamber. D. Gas outlets. E. Valve. F. Bar. G. Coils. H. Hammer.

The valve is raised by a hammer pivoted on a fixed point, and on which the tail of the valve presses. A raising or lowering of the valve is produced by means of the annular slot cut into a cylindrical rod which moves horizontally. In one of the extreme positions of the rod (corresponding to the closing of the valve), the head of the hammer lies in the annular slot; in the other position (corresponding with the opening), this head is raised on the cylindrical portion of the rod next to the slot. The rod is moved horizontally as follows: It slides freely in two horizontal half-tubes of copper, fixed perpendicularly to the body of the cock; two bobbins being arranged on the tube, one corresponding with the opening and the other with the closing. The bobbins—simply threaded on the tube, and held in place by threaded iron plugs—are entirely outside the apparatus, and unconnected with the gas. The coil is completely protected by an iron casing, and the magnetic circuit, which is formed in part by the casing, is completed by the plug and the rod. The horizontal movement of the rod thus takes place under the double action of magnetic attraction of the plug and the electro-magnetic effect exercised by the coil of the bobbin on the iron core formed by the rod—that is to say, the circuit tends to close by the displacement of the rod, and the attraction is further increased by the form of the plug and of the ends of the rod, which instead of being flat are conical, thus increasing the surface attraction for a given degree of displacement. Friction of the rod is reduced by fitting it with two rims round it; these forming the only surfaces in contact with the tube in which it moves. All the iron parts are protected from oxidation by special metallic casings.

Lastly, the passage of the gas, instead of being direct, is reversed by a system of passages in the body of the cock. Thus the closing of the valve is rendered more certain than is usually the case where a weak spring is used which may relax under the action of heat or wear and tear. Such a valve has to overcome the pressure of the gas, which is usually exerted in the direction of opening, and may become so great as to lead to leakage. In the apparatus now being described, on the contrary, closing takes place in the direction of flow of the gas, and is thus ensured by the weight of the valve and the action of pressure on the latter. Increase of pressure only has the effect of rendering the closing more perfect. The light spring which is used merely serves to prevent any chance displacements of the valve, chiefly during transport. The cock is completed with two stout screw terminals and by connection to the transformer above described, which is fitted to the cock by a double clamp, and the coil of which is connected in tension with the opening bobbin of the latter. The height of the apparatus does not exceed 32 mm.—a point of the greatest importance in such devices.

The apparatus intended for use with inverted burners may be placed directly over the burner; and it there works perfectly, despite the high temperature to which it is subjected. It is similar in every respect to the previous model, except as regards the direction in which the gas traverses it.

Numerous trial installations of the apparatus—both for direct and distant lighting and with both upright and inverted burners—have been under examination for over a year, and are said to have given entire satisfaction under the most varied conditions.

The Council of the Royal Society of Arts, with the approval of the President (His Royal Highness the Duke of Connaught), have awarded the Albert Medal of the Society for the current year to the Hon. Charles A. Parsons, C.B., F.R.S., &c., for his experimental researches into the laws governing the efficient action of steam in engines of the turbine type, and for his invention of the re-action type of steam-turbine and its practical applications to the generation of electricity, the ventilation of mines and other large spaces, blast-furnace work, ship propulsion, and other important purposes.

DIRECT ABSORPTION OF AMMONIA.

By M. Grebel.

[A Paper read before the Société Technique du Gaz en France.]

"During forty years gas-works were the model for coke-ovens; for some years past, the reverse has been the case." Such is the text taken by the author for a work he is about to publish on "Principles and Recent Improvement in Recovery Plants and the Direct Treatment of Gas-Works and Coke-Oven Bye-Products." From this, he abstracted the paper he read at the Marseilles Congress on "The Direct Absorption of Ammonia in Gas-Works." He says in his paper that the gas industry ought to take advantage of the information offered to it by the metallurgical coke industry, not only in the carbonization of coal, but as to working up bye-products. He thinks that it is in this part of their manufacture that gas engineers can make the most directly applicable technical and practical borrowings. Formerly, gas-works' bye-products had a commercial value three times that of those from coke-ovens. While the former only separated the tar, ammonia, and sulphur in order to comply with the clauses of their contracts, the latter could not neglect the balance of the profit from their bye-products. Thus urged on by necessity, they have made great progress in their recovery and treatment. Now that gas is sold so cheaply—sometimes less than 20 centimes per cubic metre in towns far from colliery districts—gas-works must concern themselves with economically abstracting and treating ammonia, cyanogen, and sulphur—not purely and simply to get rid of them, but to sell them advantageously. Instead of doing one's best to discover in foreign gas publications the smallest note apparently approving of the old practice, it is better to set free, from the works of German, English, and Belgian engineers of gas-works and coke-ovens, modern tendencies of the two sister industries. At last year's Congress, the author drew attention to new apparatus connected with the process of hot tar extraction. This year it is the direct absorption which is the complement of it. It is proposed to give some general information (largely taken from the paper by Herr Rau before the Metallurgical Congress at Dusseldorf, 1910), which can be tested in gas-works.

Historical Summary.

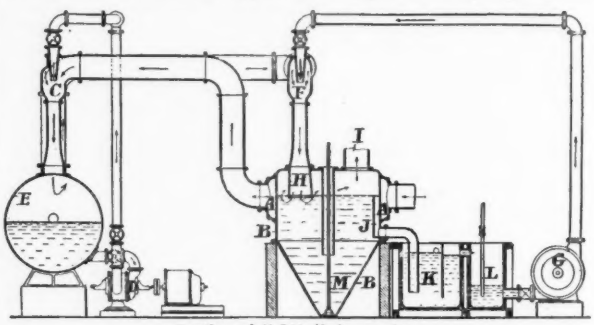
We are not concerned here, the author said, with the recovery of ammonia by salt solutions, nor by sulphuric acid made by means of the hydro-sulphuric anhydride of the gas (Feld, Burkheiser, &c.). The washing with water used during half-a-century by the gas industry and then by coke-ovens has, obviously, advantages, but also inconveniences. It enables nearly all the ammonia to be taken out, but with bulky apparatus. On the other hand, it produces at the same time tar, carbonic acid, hydro-sulphuric anhydride, and various compounds of cyanogen, which are difficult to separate from the ammonia. In the distillation of ammoniacal liquor, one is often troubled to get rid of the gaseous and aqueous residue. The quantity of water which has uselessly to be brought up to boiling-point is considerable, as the average amount of gas liquor is only 1 per cent. (10 grammes per litre). Lastly, to split up the fixed salts, which often represent 15 per cent. and more of the total ammonia, it is necessary to use lime, which has afterwards to be cleared. Without counting the amounts sunk in apparatus and tanks, the outlay for steam, water, and lime, pumping expenses, and the making of lime water, is obviously not negligible. Therefore the research into processes of what may be called "sulfatation," or rather direct absorption, is warranted.

The question is not absolutely new. The late M. Mallet, whose name is always recalled whenever the history of any branch of the ammonia industry is mentioned, had (about 1840) thought of a practical apparatus for washing with acid. In 1852, Laming proposed the use of sulphurous acid. Many works formerly recovered ammonia by washing with sulphuric acid in the form of a brine, more or less polluted, which had then to be evaporated. This hardly economical practice has not yet completely disappeared, notwithstanding the great inconveniences of the manipulation and concentration of the tarry acid solutions. The Société de Carbonization has for some time used, for completing the washing of the liquor from their coke-ovens, acid which has served in a closed circuit and become charged with ammonia, and is then utilized in the saturators of the ammoniacal liquor works. Brunck was the first to get directly crystallized salt (1903). Having observed that the acid ought to be hot (80° to 85° C. at least), he obtained a reheating by steam or by the hot gas itself. A second saturator caught the traces of ammonia which escaped the first. His process failed then by reason of the fact that the hot gas still contained a lot of tar. It is essential that this should be taken out before reaching the apparatus. If it is worked off by cooling, the liquor is deposited at the same time as the tar, and retains the greater part of the ammonia, which necessitates the use of the ordinary distilling apparatus. It was explained last year how gas tar could be eliminated at 80° C.; it being at this temperature in the form of a mist. Brunck succeeded in 1905 in separating the tar centrifugally. The Otto firm in 1906-7 effected it by an injection of atomized tar, the drops of which act mechanically and by solution on the mist which it is proposed to condense. Herr Hilgenstock says that the sulphate obtained by the Otto system contains 25·3 per cent. of ammonia and 0·2 per cent. of free acid; and that it is sufficiently white and without smell very shortly after heaping. In 1910, there were in Germany 653 Otto ovens in action, and 1000 under construction, provided with hot tar extraction and direct "sulfatation." In other countries, there were 284 ovens in use and 396 being built.

Koppers in 1904 and in 1908-9 separated the tar by cooling at 30° C. He avoided liquor washers only, and was therefore obliged to distil the condensation water in order, after the saturator, to return the ammonia into the gas. The latter, once relieved of its tar, is reheated by the hot crude gas up to a suitable temperature. Other technicians maintain that it is quite useless to reheat after condensation at ordinary temperature. Koppers reheats the tar-relieved gas up to 50° C., according to Schreiber, and up to 80° C., according to Peters and Meyn. The coal gas charged with ammoniacal gas is led by a dispersing crown with holes into the large closed saturator of the Wilton type. The deposit of salt in the expansion chamber of the saturator is avoided either by rinsing or by condensation brought about by cooling. In 1910, there were in Germany 775 Koppers ovens in service, and 105 under construction, provided with this system of direct absorption. In other countries, there were 80 in use and 914 being erected.

The Otto Apparatus.

In the accompanying illustration is given an outline of the Otto apparatus, according to the French patent of September last. The crude hot gas, which first of all circulates in an envelope A is used for reheating the saturator B. By the injector C, which a pump D feeds with hot tar, it is relieved of the tar, which is received in the collector E. While in existing plants the gas is led by two distributing pipes into the bottom of the acid contained in a saturator of the same external form as in the diagram, the Otto system is to make the hot and tar-relieved gas pass through the injector F, which is supplied with liquid acid by a pump G.



Section of "Otto" Apparatus.

A more complete reaction would thus be assured than in the large saturation vessels provided with the ordinary means for increasing the contact of gas and liquor. To avoid the acid being carried off and to complete the washing, the end of the injector dips lightly into the saturating bath H. After this last bubbling through, the gas leaves (at I) practically free from ammonia, and passes into a cooler in order to have its steam extracted. The mother liquor is run out by the overflow J into a separator K, where the small amount of light tar which was able to float on the bath is retained. This mother liquor is continuously retaken by the pump G from the vat L. An ejector M lifts the salt deposited in the saturator B into a dryer.

When it is desired to bye-pass the distilling apparatus, it is not necessary to form liquor from condensation before washing with acid; and therefore the temperature of the gas should not be allowed to go below the point of condensation of the steam (coming from the water of formation and the hygrometric water in the coal) which it contains. According to Peters, the coals yielding metallurgical coke give per cubic metre of dry gas, reduced to 0° and 760 mm., 10·2 to 12·6 of ammonia, and 144 to 747 grammes of steam. At the cooling of the gas containing 747 grammes of steam, 712 grammes are deposited at 30°, 391 grammes at 70°, 42 grammes at 80°, and none above 81° (the point of condensation). The condensation water contains fixed salts of ammonia (from 10 to 15 per cent. of the total ammonia) and volatile ammonia, the amount of which is defined by the solubility at the given temperature. Half of the ammonia is thus separated at the ordinary temperature. In the gas, there remains 3 kilos. of steam out of 100 kilos. of gas liquor.

Advantages of Direct Absorption.

The author then proceeds to consider certain theoretical aspects of direct absorption; and he afterwards sets out its advantages. The Otto class of apparatus, which avoids condensing liquor and its distillation, is generally applicable. It was said last year that the liberation of the acids of fixed salts, such as hydrochloric acid, might be feared; but this would not occur by reason of the restricted temperature of the bath (80° to 85° C.) and its low degree of concentration. Even the presence of chloride of ammonium in the sulphate recovered has been ascertained—the latter not being blued because the ferrocyanides are not formed at a low temperature. The gas would remain, moreover, ammoniacal, as practically only 95 per cent. of the ammoniacal salts are recovered; the Otto guarantee being 90 per cent. The advantages attributed to the process of direct absorption with hot condensation are:

1. Reduction in first cost by doing away with nearly all the condensing and washing apparatus, pumps, separators, and liquor tanks, distilling columns, and by diminishing the sizes of the necessary buildings.

2. Saving in labour and upkeep by doing away with the circulating and storing of ammoniacal liquor.
3. Higher yield because of avoidance of leakage during the many manipulations of the ammoniacal liquor.
4. Saving in steam, water, and lime, by doing away with apparatus for condensing, washing, and distilling.
5. Avoidance of waste liquor, sludge, and residual gas.

The objections raised at the outset seem now to have disappeared. Most of the firms building coke-ovens or recovery plants are studying the question. The Simon-Carvès Company, in England, have adopted the Brunck process; the firm of Solvay, of Brussels, are carrying out commercial tests at Seraing with apparatus on their own system; and M. Paul Mallet is also going on with practical experiments.

Adoption in Gas-Works.

Schreiber has shown that direct absorption does not at all influence the heating power, amount of benzol, and the composition of the gas. As in gas-works the coal is put into the retorts dry, the point of condensation of the steam is much lower than in coke-ovens. Without going so low as the usual temperatures, the gas could be cooled below 60° to 80° C., which would avoid all eventual difficulty with fixed salts or naphthalene, and should reassure the most timid. However, with the permanent wet sealed hydraulic mains of modern gas-works, the case is special. It is well known that it has several times been proposed from another point of view to do away with the seal during carbonization, and to resume it during the charge—either by lowering and then raising the water level, where there is a separate hydraulic main for each bed, or by means of special arrangements of levers, valves, and the like. It is also known that certain new systems of chamber settings do not have dip-pipes; but these arrangements do not appear as yet to be practical.

Generally with a large hydraulic main, amply supplied with water, the temperature of the outgoing gas varies between 80° and 60° C. In consequence of the bubbling, the gas can mechanically take away a little water, which is deposited farther on, and is saturated in every case with steam at these temperatures, after having given up the greater part of its fixed salt to the water in the hydraulic main. At 60° C., a cubic metre of gas reduced to 0° and 760 mm. carries 195 grammes of steam. With a make of 30 cubic metres per 100 kilos of coal, this corresponds to $0{\cdot}195 \times 30 = 5{\cdot}85$ kilos. of water per 100 kilos. of coal—a figure which is higher than the normal quantity of hygrometric water and water formed during carbonization. If the gas is cooled after its outlet from the hydraulic main, where it bubbles through the water, it gives up, with the tar, condensation liquor, and consequently ammonia. It would, therefore, be advantageous to try direct absorption, with tar extraction by tar-washing a little below 80° to 60° C., to give up the seal during carbonizing, so as to benefit by a low point of condensation of the aqueous water of the crude gas, coming from dry coal, and so as to cause as much as possible of the fixed ammoniacal salt to reach as far as the saturator.

AMMONIACAL LIQUOR FLOW INDICATORS AND METERS.

By M. Chevalet.

[A Paper read before the Société Technique du Gaz en France.]

Both in the gas industry and in chemical products works it is necessary at every moment to regulate the flow of liquids, generally for a rather small stream. To regulate the opening of the tap, it is usual to gauge by the eye the size of the jet. Take, for example, a gas-washer. The foreman opens the water-cock more or less; and some hours afterwards he finds that the strength of the liquor is much too low. He thereupon reduces the flow to a few drops; only some hours later to reverse the operation. The result is, therefore, a series of fluctuations which do not conduce to satisfactory working in washing the gas. It is consequently important to provide each tap with an arrangement so as to know the exact manner in which it is working, not only as regards the extent to which it is opened, but as to the variation in the flow of the liquid caused by the change in the opening of the tap.

M. Roche, in two papers contributed in 1908 and 1910, described, under the name of "flow regulator," an apparatus solving an analogous problem, but which necessitated being supplied from a tank at constant level, and was not able to be inserted on a pipe in service. Moreover, M. Roche's apparatus had rather for its object to effect a strictly regular flow; while the present author's arrangement is to make visible—that is, to indicate—the variations in flow.

A Flow Indicator.

The flow indicator designed in 1903 consists, in its present form as shown in fig. 1, of a cast-iron T, the lower branch of which has either an orifice with thin sides, or a washer bored with a carefully calibrated fitting. This anti-friction washer is simply screwed by hand so as to be very easily renewed. The other opening of the T has a glass tube, fixed like a water-level tube, so that, by regulating it to a point which coincides with the orifice, the water level in the tube can be read—that is, the load at the orifice. If the opening of the tap regulating the water is altered, it is seen that, even by very slight variations, the level of the water in the tube rises and falls; and experience has shown this arrangement to be very accurate. By direct experiment, the amount of water flowing in a given time under a given pressure is ascertained, and from several such tests a table or curve is obtained, by means of which the apparatus is transformed into an instantaneous flow-meter.

After giving particulars for the preparation of such a curve, the author says that the great advantage of his apparatus lies in doing without a tank with constant level, which rather complicates the putting up of similar apparatus in small works. A rather large variation in the pressure in the glass tube is relatively unimportant—for example, an opening of 1·5 mm. means a flow of 10 litres an hour at 200 mm. pressure, and only 15 litres at 400 mm. pressure. Another advantage of the apparatus is that it allows of regulating the flow of liquids under pressure. For such a case, it is only necessary to connect the end of the glass

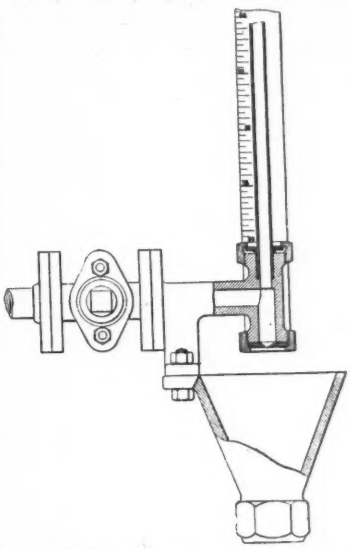


Fig. 1.—Open Type of Flow Indicator.

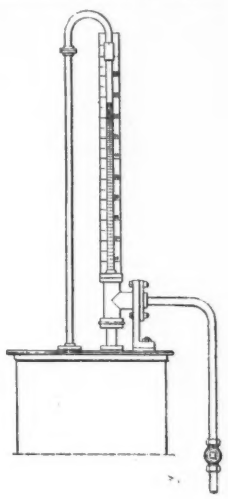


Fig. 2.—Closed Type of Flow Indicator.

tube with the vessel into which the flow is received, so that the pressure will be the same on the orifice and on the water-level in the tube. Fig. 2 shows this as applied to distilling apparatus. It is also easy to construct an apparatus giving a strictly constant flow. All that is required is to have at the side of the indicator tube an arrangement of two concentric tubes forming an annular overflow, the height of which is adjustable by making it slide in an india-rubber plug. The internal tube provides for the flow of water. The overflow-pipe may be wholly in wrought iron or in iron and copper. It can, therefore, be a strong instrument, and used for measurements within considerable limits—the glass tube being easily 1 metre to 1·20 metres in height with the same orifice.

Flow indicators are measuring instruments of value to the gas industry, as they allow of regulating flows varying from 150 litres in 24 hours for an orifice 1 mm. in diameter up to 30,000 litres for an orifice 12 mm. in diameter. The author has used them regularly in all his washing apparatus, as well as in his distilling plant for ammoniacal liquor, and also in purifying water for boilers, where very small streams of soda solution are required. They can be used for a variety of other purposes, and have been employed for ascertaining the volume of water passing through the condensers of steamship turbines, and consequently the steam consumption of these turbines.

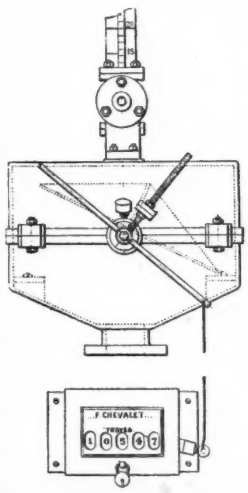


Fig. 3.—Flow Indicator Combined with Ammoniacal Liquor Meter.

The author points out that it was in the reports of the proceedings of the Society that he found a description of a flow-indicator; but it was for laboratory use. In 1884, under the title of "Process of, and Suitable Apparatus for, Absorbing Purifying Matter from Illuminating Gas," M. Parenty described an apparatus regulating the flow of liquid. But it could not be put in other than a chemist's hands. To M. Parenty, however, belongs the priority for a flow-measuring apparatus based on the measure of the charge of water on the delivery orifice.

An Ammoniacal Liquor Meter.

The flow indicators are often used to measure ammoniacal liquor; but they only give indications for the moment, and it is frequently useful to know the volume of water passed in a given time. It is impossible to measure ammoniacal liquor with ordinary meters, whether by speed or volume, because of the difficulty of

making them of metals impervious to any attack from the liquor. Every part of the measuring apparatus should be shielded from its action; and, in the author's opinion, the best meter to be used is that known as the balance-meter. The liquor to be measured is received in a trough or bucket (fig. 3) with two compartments, alternately filled and emptied by the weight of the liquor. The bucket is made of cast iron, as also are its pivots, which turn in anti-friction metal. The alternating swing movements are counted by a revolution meter, connected by a rod and lever to the pivot of the balance. The volume flowing through is calculated by multiplying the capacity of the bucket, which is regulated for an exact number of litres, by the figures indicated on the meter. This combination of a flow indicator with a totalizer is not absolutely new, but makes a compact and easily installed apparatus.

THE EXAMINATIONS IN "GAS ENGINEERING" AND "GAS SUPPLY."

List of Successful Candidates.

In the recent report of the Council of the Institution of Gas Engineers, it was stated, in reference to the publication of the results of last year's examinations in "Gas Engineering" and "Gas Supply," that the attention of the Council had been called to the decision of the authorities of the Department of Technology of the City and Guilds of London Institute not to supply pass-lists to the Press, as usual. Recognizing the great desirability of publishing the full list of names of successful candidates as soon after the examinations as possible, the Council remarked that they had been in correspondence with Sir Philip Magnus, Superintendent of the Technological Examinations, on the matter, with the result that the Executive Committee had consented that in future the results should be communicated to the Institution as soon as possible after they were ascertained. The pass-lists for the last examinations have since been sent on to Mr. W. T. Dunn, the Secretary of the Institution; and he has handed them to us for publication. It may be pointed out that the names of places in parentheses are not necessarily those in which the candidates reside, but are those of the centres at which they were examined.

GAS ENGINEERING.

HONOURS GRADE.

First Class.

Alford, Arthur N. (London Poly.)
Allbutt, Victor O. (Birmingham)
Bassett, Frank L. (East Ham)
Beynon, Frederick H. (Torquay)
Birks, Douglas (Bradford)
Brown, William (London Poly.)
Burke, Ernest (Birmingham)
Clarkson, Harry (Leeds)
Conn, Thomas (Spennymoor)
Cook, Thomas R. (Liverpool)
Craggs, Thomas A. (Newcastle-on-Tyne)
Crowther, Austin (Birmingham)
Dawes, Wilfrid (Leeds)
Dennington, Robert (Tottenham)
Dixon, John W. (Salford)
Donaldson, John H. (London Poly.)
Dunn, John W. (Newcastle-on-Tyne)
Duxbury, Rudolph H. (Manchester)
England, Albert A. (London Poly.)
Fletcher, William (Liverpool)
Goodwin, Frederick H. (Salford)
Hansford, John B. (Holloway)
Herrick, Henry D. (Birmingham)
Hinchliffe, Fred. E. (Newcastle-on-Tyne)
Hodgson, Herbert W. (Liverpool)
Holliday, James E. (Leeds)
Jeffreys, John S. (Manchester)
Johnson, Stanley B. (Hull)
Kennedy, Francis J. (Manchester)
Keywood, William T. (Brighton)
Luxon, Reginald G. (Ilfracombe)
May, Harry V. (Norwich)
Norris, William (Liverpool)
Page, James L. (London Poly.)
Parsons, Beresford F. (Birmingham)
Richmond, George W. (London Poly.)
Robinson, Frank C. (Birmingham)
Rogerson, William (Manchester)
Savage, William J. (Birmingham)
Smith, Harold C. (Birmingham)
Stapleton, Frank W. (East Ham)
Wellbeloved, Henry F. (London Poly.)
Whitehead, Sidney E. (Birmingham)

HONOURS GRADE.

Second Class.

Ames, Arthur F. (Manchester)
Atack, Frederick W. (Manchester)
Baker, Harry (Wolverhampton)
Bartlett, Oliver J. (East Ham)
Buxton, Arthur T. (Derby)
Cleator, John G. (Liverpool)
Crow, Frederick B. (West Ham)
Croxford, Leslie J. (London Poly.)
Haddock, Bernard M. (Salford)
Hill, Ernest (Manchester)
Hilson, John G. (London Poly.)
Hole, George (London Poly.)
Jones, Evan J. (Merthyr Tydfil)
Jones, Isaac J. (East Ham)
King, Walter G. (London Poly.)
Messenger, Samuel (Birmingham)
Moore, Edward S. (City and Guilds)
Quantrill, Edward A. (London Poly.)
Simmonds, Vernon (London Poly.)
Smith, James C. (East Ham)
Smith, Joseph H. (Bradford)
Smith, Maurice L. (City and Guilds)
Tew, Percy (Birmingham)
Triggs, John E. (Liverpool)
Ward, Cyril (Birmingham)
Waterfield, Edwin W. (London Poly.)

ORDINARY GRADE.

First Class.

Baker, Allan (London Poly.)
Baker, Reginald (Sheffield)
Bennett, Edward W. (London Poly.)
Booth, William E. (Liverpool)
Broadbridge, Norman P. (London Poly.)
Carpenter, William N. (London Poly.)
Clarke, Harry W. (Southampton)
Clarry, Ernest H. (Cardiff)
Cockbain, Henry A. G. (Carlisle)
Crowdy, Thomas (Salisbury)
Driver, Morris (Keighley)
Dunbovand, Hubert (West Hartlepool)
Gregson, James (Liverpool)
Hailstone, Harold J. (Birmingham)
Hay, Stephen (London Poly.)
Hodder, Alfred W. (Hanley)
Hodgson, Harry (Leeds)
Hornby, John H. (London Poly.)
Howes, Frederick N. (Sheffield)
Lant, Gerald H. (Sheffield)
Livesey, David T. (Tunbridge Wells)
Lowe, William A. (Nottingham)
Lucas, Arthur A. (Dewsbury)
Lupton, Henry P. (Burnley)
Myhill, Alphonse R. (Birmingham)
Oulds, Walter E. (York)
Roberts, Arthur R. (Hereford)
Scott, Archibald (Glasgow)
Simpson, Herbert (Sheffield)
Sissons, Herbert (Manchester)
Swan, James W. (Derby)
Taylor, James I. (Swindon)
Warburton, Christopher H. (Manchester)
Ware, Frederick H. (City and Guilds)
Whinyates, Leonard (Manchester)
Wilkins, Walter P. (Redhill)
Wilson, George G. (Birmingham)

ORDINARY GRADE.

Second Class.

Andrew, Harold (Oldham)
Bailey, Percy J. (Derby)
Blane, Edward R. (Manchester)
Boyns, Stuart H. W. (Birmingham)
Britton, Alfred B. (Birmingham)
Brown, John G. (Manchester)
Caven, Ransley (Manchester)
Clegg, James H. (Colne)
Cook, Albert (Liverpool)
Corfield, Horace V. (New Cross)
Darby, Norman (Birmingham)
Davey, William E. (Devonport)
Dent, Edgar P. (Manchester)
Dickson, James (Glasgow)
Doidge, Percival J. (Torquay)
Dumbleton, Harry (Manchester)
Fulton, David (Glasgow)
Garrett, George S. (Birmingham)
Gash, George (Salford)
Girton, Robert (Liverpool)
Hancox, James G. (Worcester)
Hardy, Charles A. (London Poly.)
Harvey, Thomas A. (Birmingham)
Hawtin, Francis (Birmingham)
Healy, Thomas (London Poly.)
Heathcote, William (Liverpool)
Holcombe, William E. (Bath)
Hughes, Edward G. (Liverpool)
Knowles, Alexander (Inverness)
McDonald, Colin J. (Bolton)
Macintyre, Donald M. (Glasgow)
Mackwood, Henry H. (Leeds)
Marshall, William J. (Liverpool)
Millington, Percy (Birmingham)
Moreley, Fred. (Birmingham)
Morgan, William H. (East Ham)
Morrison, Eric W. (Sheffield)
Peat, Wallace H. (Reading).
Prentis, Arthur E. (London Poly.)
Probert, Edward H. (Manchester)
Procter, William C. A. (London Poly.)
Robinson, Joseph (Nottingham)
Roscoe, James (Manchester)
Shacklock, James H. (Sheffield)
Shaw, Balmforth (Huddersfield)
Slack, Leo G. (Barnsley)
Smith, James (Dewsbury)
Sutcliffe, Herbert (London Poly.)
Taylor, George L. (Bradford)
Taylor, Herbert A. (Barking)
Tylden-Pattenson, Percy R. (Peterborough)
Van Goethem, Jan C. (City and Guilds)
Vickers, William (Manchester)
Vince, Francis H. (Birmingham)
Wadhams, William (Ashford)
White, Frederick (Sheffield)
Wilson, Alfred C. (Birmingham)
Wood, Herbert (London Poly.)

GAS SUPPLY.

HONOURS GRADE.

First Class.

Allbutt, Victor O. (Birmingham)
Bassett, Frank L. (East Ham)
Batty, Thomas E. (Sheffield)
Berry, Arthur G. V. (East Ham)
Birks, Douglas (Bradford)
Broadberry, Leonard (City and Guilds)
Burke, Ernest (Birmingham)
Carmichael, Thomas (Glasgow)
Carpenter, Samuel A. (L.C.C. Centres)
Cattell, William H. (Birmingham)
Conn, Thomas (Spennymoor)
Dees, William J. (New Cross)
Dyson, Thomas (Halifax)
Evans, Owen (Liverpool)
Hughes, George H. G. (Wrexham)
Johnson, Stanley B. (Hull)
Kennedy, Francis J. (Manchester)
Lea, Herbert W. (Liverpool)
Lees, Frank P. (Leeds)
Robertson, Robert (Bath)
Thornley, James W. (Manchester)

HONOURS GRADE.

Second Class.

Aitken, Harry A. (Edinburgh)
Barclay, Warren (New Cross)
Batt, William (Birmingham)
Beal, Harry (City and Guilds)
Bevington, Stanley A. (Croydon)
Brewer, Percival P. (Swindon)
Broadbent, Arthur (L.C.C. Centres)
Clark, Frank (Bath)
Cook, Thomas R. (Liverpool)
Farr, Walter E. (L.C.C. Centres)
Godden, Theophilus S. (Liverpool)
Harding, Herbert J. (Liverpool)
Harrison, Thomas W. (King's Lynn)
Heffernan, John (City and Guilds)
Highmore, Joseph G. (City and Guilds)
Holliday, James E. (Leeds)
Kent, Archibald (Norwich)
Parsons, Edward (City and Guilds)
Peel, Fred (Bradford)
Reed, William B. (City and Guilds)
Sawyer, George (L.C.C. Centres)
Scholfield, John (Sheffield)
Seymour, Charles C. (Ipswich)
Shackleton, Edward (King's Lynn)

Smithers, Philip H. (L.C.C. Centres)
Stevens, Benjamin G. (L.C.C. Centres)
Sumner, Horace R. (City and Guilds)
Sutcliffe, Herbert (London Poly.)
Taylor, George L. (Bradford)
Tew, Percy (Birmingham)
Torlot, Ernest E. (City and Guilds)
Turner, Arthur G. (L.C.C. Centres)
Walters, Bertie H. (City and Guilds)
Watson, Stuart (City and Guilds)
Wheeler, Percival (New Cross)
Willison, Harold (L.C.C. Centres)
Willmer, Harry W. (Bradford)

ORDINARY GRADE.

First Class.

Alford, Richard T. (City and Guilds)
Bailey, Percy J. (Derby)
Bates, George H. (Reading)
Bearne, Paul O. (Torquay)
Bennett, Arthur J. (City and Guilds)
Boak, Alexander (East Ham)
Boot, Henry J. (Croydon)
Botwood, Bernard F. (Birmingham)
Bradbury, Arthur (City and Guilds)
Breary, John E. (City and Guilds)
Bridge, Harry (Liverpool)
Britton, Alfred B. (Birmingham)
Brown, James (Manchester)
Brown, John G. (Manchester)
Callard, Thomas J. (L.C.C. Centres)
Campbell, Albert J. (Liverpool)
Carney, John (Acton)
Carpenter, George E. (City and Guilds)
Channing, John (Exeter)
Chapman, William A. (Hornsey)
Cheverill, Henry W. F. (Exeter)
Colman, John (Plymouth)
Cook, Charles A. (Hornsey)
Crease, Herbert E. (Wrexham)
Crowther, Bertram (Liverpool)
Curtis, Rennie A. W. (Hornsey)
Davey, William E. (Devonport)
Down, Percy D. (Exeter)
Dubery, Stanley L. (L.C.C. Centres)
Fletcher, William (Liverpool)
Francis, Richard H. (L.C.C. Centres)
Fuggle, Harry F. W. (Guildford)
Gribble, John W. (Exeter)
Hay, Stephen (Acton)
Heathcote, William (Liverpool)
Hedges, Ernest J. (Croydon)
Hepple, Frank (Manchester)
Hewitt, Herbert (Wrexham)
Higgins, Francis (L.C.C. Centres)
Hill, William F. (Southampton)
Hodder, Alfred W. (Hanley)
Hodgson, Herbert W. (Liverpool)
Hodgson, John W. (Workington)
Howard, William C. (L.C.C. Centres)
Howie, John (Glasgow)
Illingworth, Charles (Liverpool)
Imbrie, William J. (Newcastle-on-Tyne)
Johns, Tom V. (Wolverhampton)
Jones, Edward M. (L.C.C. Centres)
Kerridge, Herbert W. (Croydon)
Keywood, William T. (Brighton)
Lawson, John P. (Brighton)
Low, William J. (Portsmouth)
Lucas, Herbert (City and Guilds)
Lucas, Ralph C. (Exeter)
Luck, James A. (City and Guilds)
Luftus, Leonard (Wrexham)
Matton, Arthur W. (L.C.C. Centres)
Mayhew, Charles A. (City and Guilds)
Millman, William J. (Exeter)
Muir, Archibald R. (Glasgow)
Norris, William (Liverpool)
Oulds, Walter E. (York)
Owen, Herbert W. (Wrexham)
Page, George (Hornsey)
Pascoe, Archibald T. (Exeter)
Pattrick, Frederic C. (City and Guilds)
Perkins, Leonard W. (City and Guilds)
Phillips, George C. D. (Acton)
Pierce, Edward (Wrexham)
Pocock, James W. (City and Guilds)
Pratt, Archibald N. R. (L.C.C. Centres)
Prentis, Arthur E. (London Poly.)
Reed, Ernest E. (L.C.C. Centres)
Reid, Frank N. (Croydon)
Richardson, William J. (Liverpool)
Richmond, Claude (New Cross)
Ritchie, Douglas (Hanley)
Roberts, Arthur B. (City and Guilds)
Rothwell, Fred. (Reading)
Savage, William J. (Birmingham)
Sawbridge, George T. (Sheffield)
Scaife, Frank L. (Newcastle-on-Tyne)
Standing, Ernest (City and Guilds)
Standing, Sidney (City and Guilds)
Strathern, James (Glasgow)
Taylor, Albert C. (Lancaster)
Taylor, Frank (Manchester)
Taylor, James I. (Swindon)
Thompson, William H. (Exeter)
Tomlinson, George (Derby)
Tuckett, Charles L. (Exeter)
Tylden-Patterson, Percy R. (Peterborough)
Vallance, Arthur S. (Torquay)
Van Goethem, Jan C. (City and Guilds)
Vardill, William H. (Croydon)
Ware, Frederick H. (Maidstone)
Wellbeloved, Henry F. (Acton)
Whitehead, Sidney E. (Birmingham)
Whitley, Albert (Wrexham)
Wilkins, Walter P. (Kingston-on-Thames)
Wilson, Thomas J. (Glasgow)
Woodfine, Frank E. (Croydon)
Wood, Herbert (London Poly.)
Wortley, George W. (Sheffield)

ORDINARY GRADE.

Second Class.

Adams, Sidney (L.C.C. Centres)
Alexander, Albert E. (City and Guilds)
Andrew, Harold (Oldham)
Asker, William H. (Croydon)
Barker, Leonard A. W. (Norwich)
Bately, Bernard G. (City and Guilds)
Bather, Benjamin M. (Croydon)
Bellamy, Frederick B. (L.C.C. Centres)
Bennett, Sidney (Hornsey)
Bishop, William H. (Southampton)
Blethyn, Albert (City and Guilds)
Blondin, Francois J. G. (Acton)
Bone, Richard E. (City and Guilds)
Bottomley, Harold (Hull)
Boyns, Stuart H. W. (Birmingham)
Bradshaw, Frederick (Liverpool)
Briggs, Richard A. (Croydon)
Brooks, Joseph D. (L.C.C. Centres)
Butler, Stanley C. (Eastbourne)
Caldwell, James A. (Liverpool)
Caven, Ransley (Manchester)
Clegg, James H. (Barnoldswick)
Clubley, Charles (Hull)
Cook, Albert (Liverpool)
Cotton, Francis J. (Liverpool)
Cronk, Leonard A. (L.C.C. Centres)
Crowdy, Thomas (Salisbury)
Cullington, Alfred W. (Great Yarmouth)
Darby, Norman L. (Birmingham)
Davies, John (Liverpool)
Davy, Bert J. (New Cross)
Dicker-Jones, Thomas (Wrexham)
Dickinson, Harold A. (Colne)
Digby, Edward (Acton)
Driver, Morris (Keighley)
Duplantier, Ernest A. (City and Guilds)
Edwards, Frederick (Liverpool)
English, Harry (Dewsbury)
Fearon, Thomas (Liverpool)
Fevyer, Ernest W. J. (L.C.C. Centres)
Foreman, Robert (Croydon)
Fowler, Thomas G. (L.C.C. Centres)
Gash, George (Manchester)
Gibson, Robert (Edinburgh)
Goodall, Robert J. (L.C.C. Centres)
Goodier, Herbert (Liverpool)
Goss, John A. H. (Torquay)
Gray, James (City and Guilds)
Guy, John W. (City and Guilds)
Hall, William E. J. (Croydon)
Hancox, James G. (Worcester)
Hare, Henry (L.C.C. Centres)
Harris, Charles (L.C.C. Centres)
Harvey, Thomas A. (Birmingham)
Heath, John R (Hanley)
Henn, Karl (Birmingham)
Henson, William E. (L.C.C. Centres)
Heuser, Frederick (City and Guilds)
Higgins, John (L.C.C. Centres)
Hole, Sidney (Leeds)
Holland, Fred. (L.C.C. Centres)
Holmes, Edward (Liverpool)
Horne, Sidney (Hull)
Horton, Alfred E. (City and Guilds)
Hughes, Edward G. (Liverpool)
Hughes, Herbert (Wrexham)
Hunt, Henry A. (City and Guilds)
Isaac, Henry A. (Liverpool)
James, William H. (Torquay)
Jeffrey, John S. (Manchester)
Jennings, Alfred T. (L.C.C. Centres)
Johnson, John R. (L.C.C. Centres)
Jones, Herbert C. (City and Guilds)
Kluber, William (New Cross)
Lloyd, Edward (Wrexham)
Lloyd, Sam. S. (Halifax)
Long, Arthur (L.C.C. Centres)
Lyth, Frank (Huddersfield)
McDonald, Colin J. (Bolton)
McEnnerney, Michael (Keighley)
McGregor, Robert L. (L.C.C. Centres)
Marsh, Frederick G. (L.C.C. Centres)
Marshall, Henry R. (Liverpool)
Marshall, William J. (Liverpool)
Mead, Donald A. (Tottenham)
Miller, Albert J. (Croydon)
Miller, Alfred (Hull)
Milward, Joseph J. (Liverpool)
Mobbs, Rupert E. (L.C.C, Centres)
Moger, Robert W. (East Ham)
Moreley, Fred. (Birmingham)
Munslow, Arthur H. (Battersea)
Nicholson, William E. (City and Guilds)
Oakley, Charles E. (L.C.C. Centres)
Ogilvy, Bertram L. (City and Guilds)
Oram, Frederick G. (City and Guilds)
Owen, Joseph E. (Wrexham)
Parsons, George W. (L.C.C. Centres)
Partridge, Charles (New Cross)
Poupard, Clifford C. N. (New Cross)
Quelch, Stephen J. (City and Guilds)
Rawlins, Tudor J. (City and Guilds)
Ringe, Allan (L.C.C. Centres)
Roberts, Arthur R. (Hereford)
Satch, Arthur G. (City and Guilds)
Sayffert, Alfred M. (City and Guilds)
Scholes, Robert J. (Manchester)
Scurrell, George (City and Guilds)
Searle, Frederick (Exeter)
Shaw, Balmforth (Huddersfield)
Smith, James (Dewsbury)
Smith, Joseph H. (Bradford)
Sparling, John (Manchester)
Squires, Ernest H. (L.C.C. Centres)
Summers, William (Croydon)
Sumnerhayes, William F. (City and Guilds)
Sutton, William E. (City and Guilds)
Todd, John H. (Liverpool)
Turner, Frederick (L.C.C. Centres)
Twyford, Arthur (City and Guilds)
Urquhart, James (Glasgow)
Wallace, William H. (Wrexham)
Ward, Cyril G. (Birmingham)
Ward, John J. H. (Hornsey)
Waters, William A. (L.C.C. Centres)
Welstead, Sidney H. (Croydon)
West, George W. (L.C.C. Centres)
Wheeler, Ernest J. (City and Guilds)
Wheeler, Horace F. (L.C.C. Centres)
Wickens, Charles H. (Croydon)
Williams, George B. (City and Guilds)
Wilson, George G. (Birmingham)

Management of Suction Gas-Producers.—We have received from the publishers, Messrs. Percival Marshall and Co., of Poppin's Court, E.C., a little book entitled "How to Manage a Suction Gas-Producer," by Mr. W. A. Tookey, who may be known to some of our readers as the author of several works on gas and oil engines and gas-producers. The author recognizes that an attendant in charge of a producer of the kind in question sometimes feels the need of a work of reference to enable him to overcome difficulties experienced in its manipulation, and to undertake renewals and repairs. This was his reason for writing the book. No attempt has been made to deal with the scientific aspects of the manufacture of producer gas; but he hopes that, by its aid, the practical details of every-day operation will be found explained in language which does not demand technical knowledge. The price of the book is 1s. net.

Preserving Coal from Atmospheric Action.—Experiments have been made in Germany with a view to ascertain the best means of preserving coal from deterioration after it has been mined. The coal experimented with consisted of lumps about ¾-inch in size; vessels of about ½-gallon capacity being charged with it, and provided with air-tight covers. The vessels were further filled either with water or with carbon dioxide, flue gases, or sulphurous acid vapours. Samples were taken and analyzed after two weeks, three weeks, and six months; at the end of this period no further weathering seemed to occur. Parallel tests were made with coal exposed to the air. The different sorts of coal did not all behave equally; but, on the whole, it would appear from the results of the experiments that little is gained by keeping the coal in special atmospheres or under water, though submarine storage has been reported as being effective in other instances.

WATER SUPPLIES OF RIVER BASINS.

At the recent Annual Meeting of the Association of Water Engineers, a paper on "The Water Supplies of the River Basins of England and Wales" was read by Mr. W. R. Baldwin-Wiseman, M.Sc., Assoc.M.Inst.C.E. The subject is one of which the author has made a special study; and his papers thereon have been noticed from time to time in the "Journal." The following is an abstract of his latest production.

In his introductory remarks, Mr. Baldwin-Wiseman pointed out that during a century of development in water supply and sanitation the most marked characteristic had been the individualism with which most of the works had been planned; each being devised with a single eye to the necessities of the time and the locality, except in so far as the more or less active opposition of other interests had restricted, or in some cases impaired, the schemes. As might be supposed, this had not proved the most economical procedure from the national standpoint; for while, on the one hand, the local resources had sometimes not been developed to their maximum capacity, in other cases the friction, litigation, and expense involved, though apparently borne by the various conflicting interests, had indirectly affected the whole country, both in the increased cost of the water supplied and in many other ways. Under the circumstances, there was naturally a growing demand for legislative or administrative machinery which would co-ordinate future efforts, so that a more strictly economic development of the national water resources might ensue. Unfortunately, the same spirit of individualism had influenced the advocates of conservancy; the advancement of particular interests, with more or less disregard for the rights and claims of others, having aroused the antagonism of conflicting interests without resulting in the prospect of much material economy. It therefore behoved all water engineers, being concerned in what might be considered the paramount interest in regard to the water supply of the country, to take the lead in initiating an amicable and comprehensive settlement of the question.

The author went on to show that the idea of conserving the water supplies of the country on a national basis is by no means a new one; the earliest recommendation directly bearing upon the matter occurring in a return to an order of the House of Commons dated May 23, 1851. Eighteen years later, in 1869, a Royal Commission on Water Supply recommended "that no town or district should be allowed to appropriate a source of supply which naturally and geographically belongs to a town or district nearer to such source, unless under special circumstances which justify the appropriation." The reports made by the various Royal Commissions on Sewage Disposal contained recommendations on the subject; and in the fifth (published in March, 1908), it was advised that the control of water sources should be vested in an adequately equipped central administrative authority, and that, as far as practicable, the Rivers Boards should, in accordance with the regulations of the central authority, act as a first tribunal. Among the more important questions which were to be dealt with under the new conditions of administration were the protection of water supplies from pollution, and the collection of information as to the water supplies available and as to the need of water in various parts of the country. Last year, the Joint Committee on the Water Supplies Protection Bill referred in their report to these repeated recommendations, and advised, first, the establishment, within the Local Government Board or independently, of such a central administrative authority as that contemplated in the fifth report of the Royal Commission on Sewage Disposal; and, secondly, the division of the country into watershed areas, and the appointment for these areas of local representative boards, who (subject to the guidance and control of the central authority) "should prosecute systematic and continuous inquiries into the water supply of their jurisdiction, take all measures to husband such supplies, both surface and subsoil, secure preservation from pollution, and advise on their allocation for sanitary, industrial, and other purposes."

The need for the constitution of some central authority having been shown, the author next dealt with the administrative side of his subject, and pointed out that, before any efficient scheme of water administration could be established, measures must be taken to ascertain the water resources of all parts of the country. He considered such an investigation would require the services of expert hydrographers (preferably water engineers) who have had proper scientific training, some practical experience in hydraulic work, a good knowledge of field geology, and had undergone a course of hydrographic study. This he regarded as especially necessary in order to ensure uniformity of methods in observing and recording the various data. Though not of great use for comparative purposes, he thought the statistics already in existence might be serviceable. In 1879, a return was presented to Parliament, as the result of inquiries addressed by the Local Government Board to the 944 sanitary authorities then in existence; and only 34, of whom 20 were engaged in the construction of new works, reported their water supply as insufficient. Another return was ordered on the 24th of November last, calling for certain information in regard to every water undertaking and every district in England and Wales. The Council of the Association are interesting themselves in the collection of this information, in order to secure its being supplied (at any rate by the members) on a uniform basis.

Passing on to consider the question of the quantities of water abstracted by private concerns for purposes other than domestic supply, the author showed that one English railway company, drawing supplies from various towns along its route, in addition to 66 pumping-stations, uses 3820 million gallons in a year; the train mileage aggregating 47·1 millions per annum. As the train mileage of all the railways in England and Wales aggregates nearly 352½ millions, the corresponding consumption of water for the railway system of the country would be 28,500 million gallons in the year. The breweries of England and Wales have used annually, during the past fifteen years, from 9700 to 15,700 million gallons of water; and in the case of the distilleries, the mean annual consumption in the period between 1847 and 1909 has ranged from 280 to 650 million gallons. The railways, breweries, and distilleries, therefore, consumed alone as much water in 1909 as would, at 25 gallons per head per day, have sufficed for the annual supply of 4,915,000 people, or 13·6 per cent. of the present estimated population of the entire country. When to this figure is added the consumption of other trades, and the waste of water from mines, quarries, and tunnels, the author thought it quite probable that the quantity of water abstracted by all the water authorities in the country was only about one-fourth or one-fifth of that taken (or wasted) by other agencies.

Having shown the necessity for the collection of data in connection with the conservancy of the national water supply in accordance with some uniform and comprehensive scheme to be drawn up by experts, the author expressed the opinion that it would be necessary at an early stage to know the rate of growth of the population, not in towns or counties, but in the various river basins. In order to decide whether any given area might be regarded as self-supporting, or able to afford assistance to others, he had prepared an elaborate series of tables which were appended to the paper. They furnished details as to the populations, water supplies, and rateable values in river basins and main drainage areas. They were accompanied by a map showing the density of the urban population in the river basins.

With regard to the legal aspect of the question, though there is much "statute" and "case" law as to both surface and subsurface water, the author said, the whole needed codification and amendment. It is, however, generally agreed that this should be deferred until data have been collected and the requirements of the case have been more fully ascertained. On the subject of cost, he said it might be alleged that all the foregoing and kindred proposals would entail considerable expenditure. But, under any circumstances, he thought the burden would be much less than that now borne by water authorities, and therefore by water consumers, in connection with the opposition which promoters of schemes of water supply have to encounter. On this point, he called attention to the fact that the vested interests of water conservancy aggregate something like £260,000,000, of which the capital invested in water supply is about 56 per cent.; and as the rateable value of the country is nearly £210,000,000, the cost of the survey would represent an inappreciably small premium on either of these sums. He thought 1·20th of a penny in the pound on the rateable value should be amply sufficient to inaugurate an efficient survey.

In conclusion, the author said he would deprecate the unfortunate spirit of pessimism which, while it concedes that water conservancy is highly desirable, urges that it is too ideal ever to be realized, as various important innovations and reforms with regard to agriculture, the decennial census, local administration, the poor law, and other matters of every-day routine, which are now regarded as commonplace, were developed under much less favourable conditions, by the mere persistent advocacy of one or two individuals. He ventured to suggest that the Association might reasonably memorialize the Local Government Board to apply to the Development Commission for a grant towards the investigation of the water resources of the country under the Development Act of 1909; the object in view clearly coming within the definition "any other purpose calculated to promote the economic development of the United Kingdom." With such a grant, it would, he said, be possible to inaugurate at once the collection of data on a comprehensive basis. Meanwhile, the returns now being collected by the Local Government Board would, no doubt, carry the whole question farther forward than any previous action by Government, and the influence and assistance of the Association would also largely contribute to a successful result under this head. More, however, was needed; and advocates of conservancy must persist in their demands until an official survey is organized, and, in place of records collected and published at infrequent and irregular intervals, continuous data are published in annual reports, by a properly-organized Government Department, and the work is thus brought into line with that of all other modern progressive states.

Discussion.

Mr. Easton Devonshire (London), referring to the part of the paper dealing with the demand for water conservancy, said he should like to see some practical outcome to the opposition which was made by the Association to the Water Supplies Protection Bill last year. He held the opinion that, as regarded the conservancy of the national water supply, the work should be in the hands of a central independent authority, with agents or inspectors all over the country solely responsible to the central body. The work of such an administrative authority would, no doubt, be taken up largely by voluntary helpers; and it would be

assisted by members of the Association. He was quite sure that a mass of useful information would be placed at the disposal of the central authority through the Association; and in course of time the authority would, with the information at its command, be able to divide the country into districts, which would be on the basis of geographical counties. Then the different districts would be placed under the control of water boards, the members of which would be representative of the interests of those who required water.

Mr. PERCY GRIFFITH (the Secretary of the Association) said the subject dealt with in the paper was one to which he had given a great deal of attention, and which he had been following up in the interests of the members. He thought the Association might congratulate themselves that up to the present their position had been maintained satisfactorily, and that their influence had been felt and respected in the right quarter. He also thought members would agree that the introduction of a paper on this subject at the present juncture was to be welcomed, especially seeing that the Local Government Board had actually commenced to collect information in regard to it, and, as he understood, had taken the steps advocated by the Association. The members would be in a position to codify their own views, and be prepared for any possible development there might be on this important subject. Chiefly for his own information, he had been studying the map of England and Wales with the object of ascertaining what was the proportion of underground supplies, and what proportion was obtained from surface sources. Such an investigation was not so easy as it seemed. But, for the moment, he had prepared a statement of the counties of this country and the general character of the water supply in each; and the result was astonishing. He thought many members of the Association would be surprised to learn that an enormous proportion of the area of this country was supplied from underground sources. And in making his calculations, he thought he was entitled to call all water obtained from springs—water absolutely stored and coming out of the ground—as underground water. A summary of the counties showed that there were fifteen large and important ones supplied entirely from underground sources; the only exception being an isolated case on the central eastern coast, where the water had become saline, and river water had to be utilized. It might be taken that the whole of the eastern, central, and southern parts of the country had their supplies from underground sources; and on the west a considerable part of the supply was from springs, which must be classed as underground. There was not time to go into the figures, then; but it was clear, from the investigations he had made so far, that an enormous area of the country derived its water supply from underground sources. As to the proposals for the establishment of new judicial authorities for dealing with water supplies, he thought it a question which water engineers could not look upon with equanimity. The general opinion among them was that they did not want to hurry in this direction in any way; and there were some who held the view that they could well do without certain of the authorities they had now.

As there was not time for any further discussion of the paper,

Mr. BALDWIN-WISEMAN, in the course of a brief reply, said he did not see why there should be any difficulty in the working of the local rivers boards, with their sectional committees; and, as he had said, schemes approved by these bodies would be assured of a fairly easy passage through Parliament. The reason why the Inquiry Commissioners appointed under Act of Parliament were not a success was because they had no support behind them. When these Commissioners held an inquiry in Manchester and other towns, the people concerned did not "show their hand;" and the result was that the whole thing had to be fought out again at Westminster. He was of opinion that if these Commissioners had had some power to see that their recommendations were accepted by Parliament, they would have been successful.

Advertising Gas Displays in London.

The Wandsworth and Putney Gas Company are always prepared to make use of opportunities. They want the people in their district to know what there is to see and where to see it in connection with gas applications. In some of their advertisements, it is remarked that they give prominence to the gas displays at the Coronation Exhibition and to the Festival of Empire Exhibition at the Crystal Palace. This is, in miniature, how they do it:

CORONATION EXHIBITION. See the **Gas Exhibit** there: Lighting, Heating, Cooking, &c., Appliances.	**GAS**	**FESTIVAL of EMPIRE at Crystal Palace.** Notice the High Pressure Display, and Gas-Driven Electricity Plant.

The annual meeting of the Society of Chemical Industry will be held in Sheffield from the 12th to the 14th prox., under the presidency of Mr. Walter F. Reid. Among the visits arranged is one to the collieries of Messrs. Newton, Chambers, and Co., and to the Grimesthorpe works of the Sheffield Gas Company.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Proposed Publicity Fund.

SIR,—I am quite sure that all interested in the proposed scheme for co-operative publicity work and the recent appeal for financial support, will heartily thank you for the "Editorial" in the "JOURNAL" for June 13, in which you draw attention to the first annual conference of the Electric Supply Publicity Committee, as reported in the "Times Engineering Supplement" for June 7.

At the risk of repeating what has already appeared in the "JOURNAL," I venture to ask you to insert the enclosed report of the proceedings from "The Times," in the hope that those administrators who so far have not given to the Publicity and Special Purposes Committee their support to help to extend the use of gas as an illuminant, and for domestic and industrial purposes, will see their way to join the movement.

Surely if it is necessary to have an Electric Supply Publicity Fund (of the success of which there appears to be no question), it must be equally necessary that the interests of the gas industry should in a similar manner be conserved and strengthened.

It should be borne in mind that the proposed publicity scheme is to be additional to, and not in substitution for, the work already so well carried on in this direction by many well-known enterprising gas undertakings; and it is earnestly to be hoped that all will join the movement.

The well-known motto "Union is Strength" and Æsop's subtly conveyed advice in the fable of the bundle of sticks, will appeal to all who have the best interests of the gas industry at heart.

J. FERGUSON BELL.

Derby, June 17, 1911.

[ENCLOSURE.]

The Electric Supply Publicity Committee.

The First Annual Conference of the Electric Supply Publicity Committee was held last week.

In reviewing the work of the past year and outlining the programme for the ensuing year, the Chairman, Mr. H. B. Renwick, emphasized one notable fact connected with the starting of the Committee—viz., that it was the first time that the officials of the municipal undertakings and those of the company undertakings had met together for the purpose of carrying on business in their mutual interest; and he expressed the hope that the principle of co-operation would be extended in other directions. Successive issues of publicity literature had been made at frequent intervals throughout the year, comprising posters, showcards, booklets, circulars, post-cards, adhesive labels, &c., which covered practically the whole of the field of electric supply. The issues had been arranged so as to be appropriate to the various seasons of the year; and the shape and size of the publications had been carefully thought out, so as to fall in with the general office arrangements of supply undertakings.

The result had been satisfactory from every point of view; and the Committee had supplied literature throughout the United Kingdom in addition to the Colonies and abroad—the total sales during the year numbering nearly one million and a half. Newspaper advertising had also been done to a fair extent; and there was hope that in the forthcoming year this would be carried on on a much larger and more comprehensive scale. He upheld the necessity of a strenuous and systematic publicity campaign, as preparing the way for, and supplementary to, personal canvassing. The universal use of electricity for lighting, power, and the many various domestic uses could be attained only by continuous appeal. The supply undertakings must regard themselves as vendors of a commodity in exactly the same way as other tradesmen; and the methods of widespread advertising adopted by the latter were as indispensable to the one as to the other.

The Committee are making a fresh issue of publicity matter. The chief topics dealt with are the seasonable ones of cooling and ventilating by electrical means; but there is also a folder describing the advantages of electric irons, and a circular intended to promote the use of electric signs.

Dessau Vertical Retorts at Sunderland.

SIR,—I see in your report of the discussion on the four papers on vertical retorts, read at the Glasgow meeting of the Institution of Gas Engineers, that Mr. J. W. Broadhead's remarks have, since the meeting, been amplified by the addition of an inquiry as to "why the gas was subjected to a cracking process in passing through the top 2 ft. 6 in. of empty retort." In reply, I would point out that, of this 2 ft. 6 in., 12 inches are accounted for by the depth of the cast-iron mouthpiece and a further 16 inches by the portion of the retort which is built into the brickwork on the top of the setting, and which is never, of course, hot enough to carbonize coal. So far, therefore, as its active length is concerned the retort is filled with coal.

Also you make me state at the end of my reply that the charge of coal in Dessau verticals worked out between "9½d. and 9¾d. per cwt." in each retort. This clearly should read between 9½ cwt. and 9¾ cwt."

CHAS. DRU DRURY.

Sunderland, June 24, 1911.

The Discussion on Mr. Leather's Institution Paper.

SIR,—Would you kindly draw attention to the fact that the figures relating to Lausanne given by me at the Institution meeting, were those obtained up to May 3. The figures to June 9 are as follows.

Make of gas per ton	12,676 cubic feet.
Calorific power	617 gross B.Th.U.
,, ,, per ton	7,821,000 B.Th.U.
Fuel used	13·2 per cent.

P. G. C. MOON,
Assistant Engineer and General Manager.

Bournemouth, June 23, 1911.

[A paragraph giving some of the above correcting figures appeared last week, p. 834.—ED. J.G.L.]

The Reading of Papers at Institution Meetings.

SIR,—The papers read this year at the meeting of the Institution of Gas Engineers were well up to the standard of previous years, and a great deal of interest was shown by members in the respective subjects. But, unfortunately, this interest could not be shown in the practical way that members would have preferred.

The discussions on the papers had, as usual, to be considerably curtailed. This is a great pity, and removes that part of the proceedings which is probably of the greatest interest and of most use to the bulk of the members. No one is particularly interested in listening to the reading of a long paper which he may have already read himself at his leisure. It wastes much valuable time, is very tiring to the readers, and is somewhat trying to the patience of members, who are far more interested in hearing a good discussion and the bringing forward of useful points alluded to by the reader of the paper.

Is it not possible to distribute papers beforehand to all members, and either take the papers as read or confine each reader to a short synopsis of his subject? By this means, plenty of time would be left for a full discussion, and many more members would speak, to the advantage and interest of both the members and the readers of the papers. Many are chary of speaking when they know that the time is short, and that other members are waiting for an opportunity to join in the discussion.

Few will agree with the contention that, if the papers were not read at the meeting, many members would not read them at all. Any member who was interested in the subject would surely make a point of carefully reading the paper beforehand, and prepare a few notes for use in the discussion.

There may, of course, be some difficulty in getting the papers from the readers soon enough to enable the Secretary to distribute them in time for the meeting; but this would assuredly be altered as soon as it was decided to curtail or dispense with the reading of the papers themselves. Readers would then see that it was absolutely essential that their papers should be in the hands of the Secretary in good time. It is hoped that next year something in this direction may be arranged.

G. L.

June 19, 1911.

Mr. Broadhead's Institution Paper.

SIR,—In summarizing my brief remarks on Mr. Broadhead's paper in the "JOURNAL" for June 20, your reporter quite misconstrued my meaning. I quoted and agreed with the author's views that, "with heavier charges, stopped pipes and hydraulic main troubles diminish, and the make per ton decidedly improves without a corresponding deterioration in the quality of the gas." I then made a further quotation of the next sentence: "At the same time, retort temperatures must be raised proportionately to the increase in weight of the charge; otherwise nothing but a decrease in make per ton is to be expected." With this statement, my experience does not tally; and I remarked that, in our case, we found that, when we increased our charges from eight to twelve hours, we had to reduce our dampers owing to the retorts becoming excessively hot, and that, with the twelve-hour charge, we worked with our dampers opened to only two-thirds of what they were with the eight-hour charge.

G. M. GILL.

Blackheath, June 24, 1911.

Meeting of Commercial Sections in Glasgow—A Correction.

SIR,—On looking through this week's "JOURNAL," I find, on page 923, second column, two items ascribed to "Mr. Paterson" (a seconding of a motion, and a short speech), which did not emanate from me, but may possibly have come from my namesake at Queenstown, Mr. J. J. Paterson.

As on the first column I am correctly reported on the subject of lectures to gas-fitters, the further references may also be ascribed to me in default of any specific naming of any other Paterson.

I shall be glad if you can make the correction in your next issue.

JAMES PATERSON,

Cheltenham, June 21, 1911.

Corrosion of Service-Pipes.

SIR,—From a practical point of view, is not Mr. M'Leod indulging in a quibble in the concluding passage of his Institution paper on the above subject, when he distinguishes between an "acidiferous subsoil" and a subsoil which, on his own showing, by reason of its "porosity, permits access of air and moisture containing carbonic acid, which latter will, of course, not always be absorbed by the alkali of the ashes"? Of course, this is not a full and complete statement of the action which is continually going on; but as far as it goes (again from a practical point of view), it appears to answer Mr. M'Leod's contention as to the alkalinity of such subsoil.

May I also suggest that it is well, in "stating" what others have written, to quote the exact words used, and not to paraphrase?

WALTER HOLE.

Leeds, June 23, 1911.

Uses of High-Pressure Gas for Industrial Purposes.

SIR,—In your report of the discussion on the paper read by Mr. E. W. Smith at Glasgow, reference is made by Mr. Leather to experiments we made together which disproved the existing formulæ for the quantity of air injected by gas in atmospheric burners. Mr. Smith is reported to have said that I had seen his burner, tested it, and offered to finance it to the extent of a few thousand pounds. I do not know who is responsible; but I should like to repudiate these statements. I have never seen the burner, tested it, nor offered to finance it. I am, however, much interested in the subject, as I have for years been experimenting in this direction.

While criticizing one set of statements, perhaps you will permit me to ask for further information on some other points in the paper. Mr. Smith endeavours to crystallize the results of his experiments into definite statements of fact. My complaint is that he does not give sufficient information as to how his experiments were conducted, the apparatus he used, and the progressive data which enabled him to arrive at definite conclusions. This, I must admit, is asking for a great deal.

The statement that most atmospheric burners are badly designed, and do not inject a corresponding relative proportion of air with an increase of gas pressure, is confirmed by the experiments I have made. But I question whether Mr. Smith has found a solution by making a cone at an angle of 60°.

Reference is made to a ring-burner. The usual low-pressure ring-burner is rejected by Mr. Smith for high-pressure, because the jet is too big, the primary inlet is too large, and the burner-tube must be reduced to keep up the velocity of the gas and air in the burner.

How can a primary-air inlet be too large? I always make a point of testing the resistance offered to the inflow of primary air, because I consider it is bad design to restrict the passage and then boost-up the pressure to overcome the unnecessary resistance. I am also at a loss to understand how velocity is lost in a burner-tube of large diameter. I have always considered the issuing orifices controlled the velocity, and not the burner-tube. I think Mr. Smith will find this is correct. A burner-tube a little larger in diameter is no disadvantage.

The comparative tests of high and low pressure gas for heating water appear to require some explanation. The calorific power of the gas was evidently taken at low pressure. The net value was 542 B.Th.U. per cubic foot. This gas was then compressed, so that $1\frac{1}{2}$ cubic feet were measured as 1 cubic foot. Is the calorific value still 542 B.Th.U. or is it $542 + 271 = 813$ B.Th.U. per cubic foot? This would seriously affect the efficiency of 92 per cent. claimed by Mr. Smith. It appears to me that if Mr. Smith had used a little higher pressure, he could have obtained an efficiency of 110 per cent., which would have been astonishing.

Perhaps Mr. Smith can explain where I am wrong.

ALFRED MANSFIELD.

Birkenhead, June 23, 1911.

Cost of Manufacture and Selling Price of Gas at St. Helens and Widnes.

SIR,—I take it, from the absence of any reply to my letter dated the 3rd inst., appearing in your issue of the 13th inst., also that the "St. Helens Newspaper and Advertiser" this week contains no report of any further interview between Mr. Samuel Glover and the local Press representative, that Mr. Glover finds it more convenient to maintain a discreet silence rather than attempt to justify the boast in your editorial of the 16th ult., as to St. Helens being, conditionally, able to supply gas as cheap as anyone – a boast which I ventured to say was without foundation in fact; and in the absence of verification I suggest to you, Sir, that I have made out my case.

In my letter of the 3rd inst., where I gave the figures of Widnes costs per 1000 cubic feet, for the year ending the 25th of March, 1911, I find that the figure of total cost, instead of reading 9·9d., should have read 10·13d.; so that the actual figures are as follows:—

Manufacture and distribution . .	4·64d.	per 1000 cubic feet.
Manufacture, maintenance, and distribution	5·53d.	,, ,, ,,
Manufacture, maintenance, and distribution, including all charges	10·13d.	,, ,, ,,

ISAAC CARR.

Widnes, June 24, 1911.

Automatic Coal-Handling in Larger Quantities in Less Bulk.

SIR,—Mr. W. R. Herring, M.Inst.C.E., in an article published in June, 1897, wrote the following terse, thought-compelling sentence:

> "I am convinced that the best method of transporting large quantities of materials, is to do it in small quantities at a time, and not by attempting to shift it in bulk."

Mr. Herring's confident conviction was based on a diversified experience of appliances for the manipulation of materials in gas-works; but his views and advice are now having a much wider application, in the popular and profitable method of loading vessels of all sizes with coal, at much greater speed. The holds and bunkers of the largest steamers are now filled quickly by the method of handling coal advocated by Mr. Herring fourteen years ago. The coal is transported from the waggons in a continuous small quantity or layer on a high-speed coal-conveyor belt into the hold, and the clumsy and costly steel-structures and hydraulic lifts, which elevated the coal in bulk, in the waggons, are dispensed with—thereby obviating blinding clouds of coal dust and reducing the breakage. Beside these huge hydraulic lifts, the coaling belts look mere toy appliances. Still each conveyor can load over 600 tons per hour, or three times more rapidly in small quantities than the waggon lifts did in bulk.

During the last three years, the Engineers of the North-Eastern Railway Company have completely remodelled the coal-loading machinery at the Hull Docks, and the coaling-belts convey all kinds and sizes of coal from the waggons into the ships' bunkers. These belts are constructed to be raised or lowered at will, to suit any height of hatchway.

Other dock companies, both at home and abroad, are following the lead of the North-Eastern Railway. The contract has been placed for a coaling belt-conveyor plant, by the Government of New South Wales, for the docks at Balmain; and like plant is to be installed at the new docks of the Hull and Barnsley Railway Company.

In arranging coal-handling plants to charge vertical retorts, gas engineers are not likely, now, to overlook the valuable experience gained from the latest method of loading steamers with coal—an experience which has demonstrated to the full the value of Mr. Herring's views, as put forth in the statement "that the best method of transporting large quantities of materials, is to do it in small quantities at a time; and not by attempting to shift it in bulk.

GILBERT LITTLE.

Bradford, June 24, 1911.

REGISTER OF PATENTS.

Gas-Meters.

WEIPPERT, E. D., and CHESHIRE, W. D., of Birmingham.

No. 12,668; May 24, 1910.

In their specification, the patentees point out that in ordinary gas-meters where the meter spindle is connected direct to the registering mechanism, the latter simply records the revolutions of the metering drum, and indicates the number of unit volumes of gas delivered; but no account is taken of the varying quantity of gas contained in each such volume, which constantly fluctuates under variations of service pressure or other changing conditions of supply. Consequently, as a given volume of gas will contain a proportionally greater weight when delivered under a high-pressure than it will at a lower pressure, while no corresponding alteration will be made in the action of the registering mechanism, it follows that, when registering meters of the usual construction are used, increases in the supply pressure above that for which the meter is calibrated, represent a loss to the seller of the gas, since during the time that the higher pressure prevails, the consumer receives a greater quantity of gas than is charged to him by the registering mechanism.

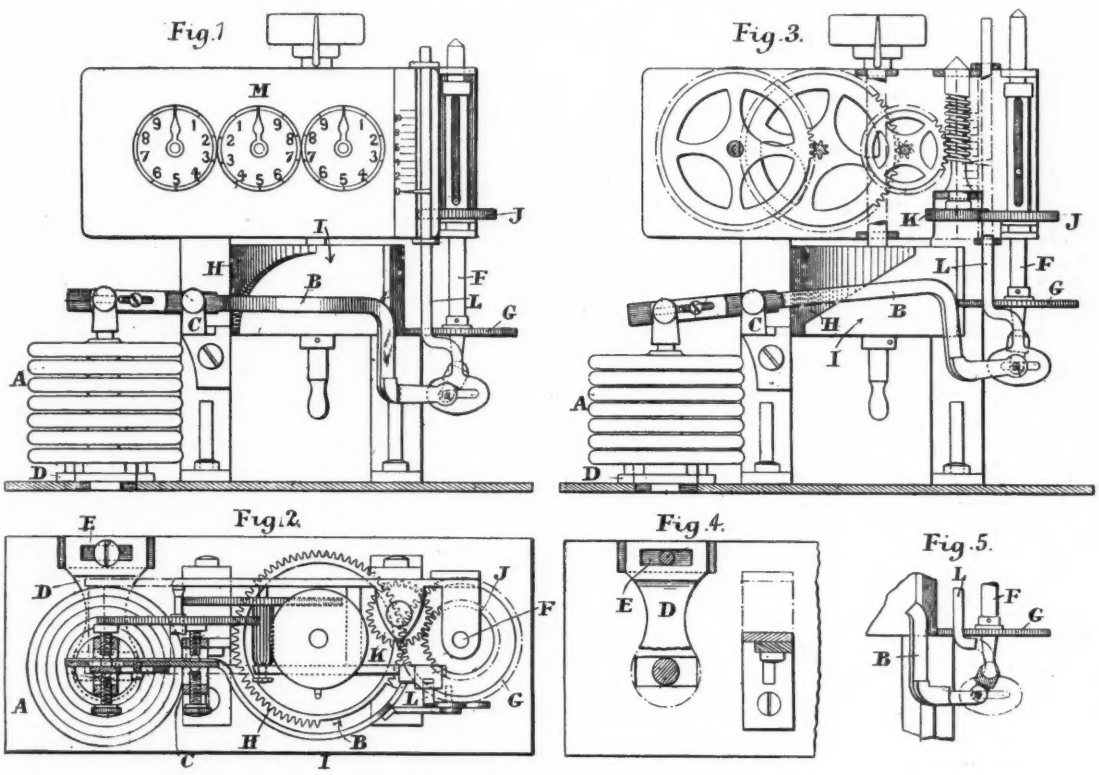
Again, it is impossible for an ordinary meter calibrated to suit one system, or one particular supply pressure, to be used for another system having a greater pressure without loss to the seller of the gas; and even when a meter is working on a system for which it has been calibrated, losses may still occur owing to temporary or unforeseen increases in the pressure.

In order to automatically compensate for variations in pressure, and correct or vary the volume measurement of the gas so as to suit the pressure at which the gas is supplied, means have been proposed, consisting of an aneroid or elastic metal chamber influenced by the gas pressure, and adapted to act upon, or control, a variable compensating gearing, such as friction gearing.

The object of the present invention is to provide, in connection with compensating mechanism of this type, a form of gearing for modifying the motion transmitted to the registering train according to the pressure; the gearing being of the mutilated or stepped type, and "comprising a mutilated toothed wheel having a plain part of gradually decreasing width, and engaging with a gear-wheel upon a countershaft whose relative position is controlled by the action of the elastic chamber."

Fig. 1 is a front elevation of the registering and compensating mechanism of such a meter. Fig. 2 is a sectional plan. Fig. 3 shows the registering mechanism in sectional elevation, and illustrates how the variable compensating gearing is operated for an increase in pressure. Fig. 4 is a horizontal section illustrating how the aneroid is adjustable along the base in order to vary the amount of movement of the lever. Fig. 5 is a view showing how the end of the rocking lever is connected to the gear-wheel spindle.

A is an aneroid or elastic metal chamber which (together with the whole of the other parts of the compensating mechanism) is enclosed within a gas-tight chamber connected up with the gas supply system. The gas then acts externally upon the aneroid, whose interior is either exhausted (totally or partially) or subjected to atmospheric pressure,



Weippert and Cheshire's High-Pressure Gas-Meter.

and causes it to expand and contract according to the fluctuations in the pressure—that is to say, when the pressure increases, the aneroid contracts, whereas when the pressure decreases, it expands. The upper end of the aneroid is adjustably connected to one end of a rocking lever B fulcrummed between two adjustable screws carried in a forked bracket C. The point of connection of the aneroid with the lever B is adjustable according to requirements, for which purpose the aneroid is movable along its base plate in a longitudinal direction. Thus, at its lower end, it is carried upon a plate D provided, upon its underside, with a stud engaging in a slot in the base. The outer end of the plate D is provided with a slot E with which engages a fixing screw, by slackening which the aneroid can be adjusted longitudinally to the desired position. The opposite end of the lever B is connected, by a combined knuckle and ball-and-socket joint (see fig. 5), to the lower end of a vertically slidable counter-shaft, arranged parallel to the meter spindle, and carrying a gear-wheel or pinion G for transmitting motion from the spindle to the train of the registering mechanism.

The meter spindle is adapted to be directly coupled to a spindle having keyed to it a toothed wheel, suitably dimensioned to provide for the full range of compensating action, but having at a portion of its periphery a plain or toothless area I, which may be either of the form shown (the teeth upon the one side being of gradually increasing length, from the top to the bottom ends of the wheel) or with the plain area of a triangular shape; the teeth being of gradually decreasing length upon both sides.

The countershaft F (which can turn in bearing brackets carried by the frame) is surrounded by a sleeve confined between the brackets and carrying the spur wheel J. Driving connection between the sleeve and the shaft F is made by a pin upon the latter engaging with a slot in the sleeve. By this means the wheel G and the countershaft F can be raised and lowered, by the action of the aneroid, without altering the position of the wheel J and without interfering with the drive thereto. The wheel J meshes with a corresponding wheel K upon the end of a worm engaging with a worm wheel directly geared to the registering train. Thus motion from the meter spindle to the registering train is transmitted from the compensating wheel to the worm gear.

The parts are so arranged that when the aneroid is influenced by the minimum supply-pressure, the pinion G meshes with the lower end of the compensating wheel, where the plain area I is widest (as in fig. 1); so that whereas the meter spindle and compensating wheel rotate continuously while the meter is at work, the motion transmitted to the countershaft and registering mechanism is interrupted during each rotation of the spindle by a pause which lasts until the widest part of the interrupted area has passed by the countershaft pinion. During this pause, the countershaft F is necessarily stationary, and no registering action takes place, although gas at minimum pressure is still being delivered. But on the pressure increasing, or when the meter is applied to a service where the pressure is higher than the minimum pressure for which the mechanism is calibrated, then, by the action of the gas on the aneroid, the latter is compressed, and the corresponding end of the lever B is pulled down; the opposite end being thereby raised and lifting the countershaft F. The wheel G is now brought opposite to a narrower part of the interrupted area I of the compensating wheel H, so that the pause which occurs in the transmission of the spindle motion to the registering mechanism is reduced in proportion to the increase of pressure, and thus the regis-

tering action is continued during a proportionally increased part of each revolution of the meter spindle. On the other hand, when the supply pressure drops, the mechanism adjusts itself to the new conditions by the countershaft pinion G, being drawn downwards, by the action of the lever B, into a position where the interruption in its rotation will be longer in proportion to the decrease of pressure—thus retarding the registering action.

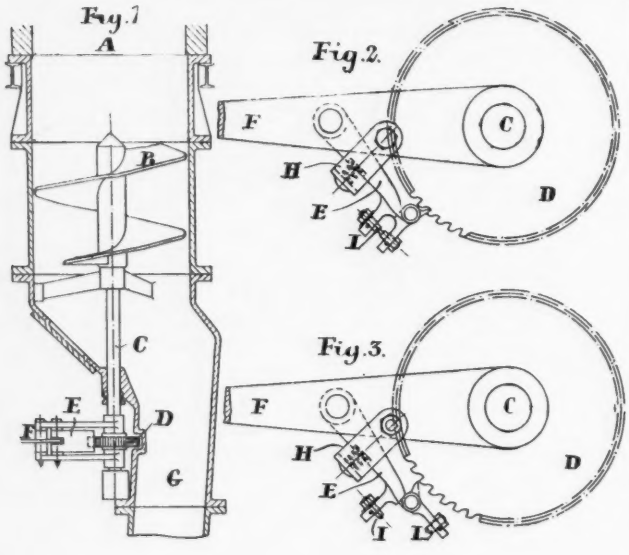
In order to give an indication of the pressure prevailing, the end of the lever B carries an arm provided with a pin engaging with a slot in the lower end of a vertical indicator bar L sliding within guides over the face of the front dial plate M, and carrying a pointer that moves over the face of a graduated scale as the pressure rises and falls.

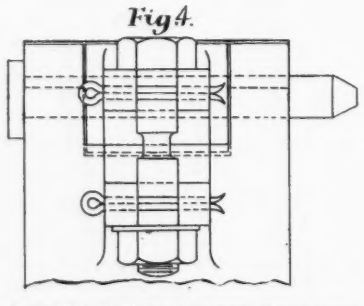
Driving Gear for Discharging Coke from Vertical Retorts.

GLOVER, S., of St. Helens, and WEST, J., of Southport.

No. 30,302; Dec. 30, 1910.

This invention relates to the driving gear of apparatus for mechanically discharging the coke from vertical retorts, in which the coal, after carbonization, is withdrawn by a mechanically driven extractor, the speed of which determines the rate of discharge to a receiving chamber which is periodically emptied of its contents. The object is to provide a safety appliance in connection with the driving gear, so that, in the event of the receiving chamber not being emptied of its contents at the proper time, and consequently becoming overloaded, the risk of breakage to the essential parts of the driving gear is prevented.





Glover and West's Vertical-Retort Coke-Discharger.

Fig. 1 (a section of the coke-receiving chamber) shows a helical discharging apparatus, which, on being rotated, extracts the coke from the retort. Figs. 2 and 3 show a ratchet wheel and a pawl drive in connection with the driving gear. Fig 4 is a larger view of the safety appliance in connection with the ratchet pawl.

A is the bottom end of the vertical retort from which the coke is extracted. B is the worm extractor driven by the shaft C actuated by the ratchet wheel D and pawl hinged to the ratchet pawl E of the lever F. G is the coke-receiving chamber. H is a spring for keeping the ratchet pawl in contact with the teeth of the ratchet wheel. The pawl is constructed with a hinged end bolted in position when in contact with the ratchet wheel by a pin I, which is reduced in diameter to allow only sufficient strength to provide for the normal conditions of working, and which will break in the event of the coke-chamber becoming over-full, and thus cause the hinged end to become inoperative by releasing it from contact with the ratchet wheel.

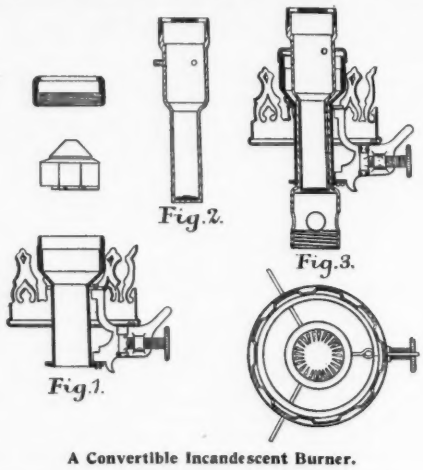
In fig. 2, the pin I is shown when the pawl is engaged with the teeth of the ratchet wheel under normal conditions; while fig. 3 shows its position when an overload has caused the pin to break, and caused the pawl to become inoperative.

Incandescent Gas-Burners.

DEUTSCHE GASGLÜHLICHT AKTIENGESELLSCHAFT (AUERGESELLSCHAFT), of Berlin.

No. 23,926; Oct. 15, 1910. Date claimed under International Convention, Feb. 15, 1910.

The object of this invention is to be able to transform the usual incandescent gas-burner of standard size into a "bijou" or "gem" burner—that is to say, a smaller burner. This transformation is effected as follows: Into the crown of a standard burner is slipped (after removal of the head ring and the parts in the burner-head) a tube which, at the top, is closed by a gauze plate, and so far projects beyond the crown-tube of the burner as to permit another mantle being placed on it. With this arrangement, "the additional advantage is obtained that the heat passing from the flame to the burner-head by conduction and radiation is conducted into the interior of the burner," and "the mixture of air and gas, before entering the flame, is better heated, and



A Convertible Incandescent Burner.

the temperature of the flame (and consequently the lighting effect of the burner) will be increased."

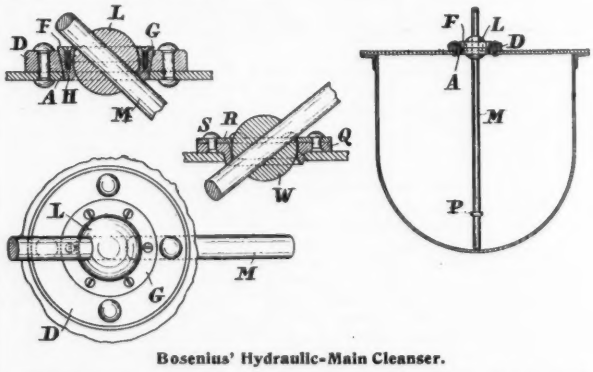
Fig. 1 represents the burner crown of an ordinary incandescent gas-burner with its separate parts; fig. 2 shows a part to be slipped into the bunsen tube of the burner to be converted; and fig. 3 shows a complete burner fitted up according to this invention, in section and in plan. It will be seen that the fitting tube is within the bunsen tube, so that the mixture of air and gas comes into contact with it, and "the heat conducted from the upper part of the burner is advantageously transmitted to the mixture of air and gas."

Cleansing Apparatus for Hydraulic Mains.

BOSENIUS, H., of Bochum, Germany.

No. 2165; Jan. 27, 1911.

The cleansing apparatus commonly used in connection with the hydraulic mains, according to the patentee, commonly comprises a ball-joint permanently mounted in the cover, with a rod projecting from it into the interior of the main. With this class of device, there must be as many cleansing appliances as there are places at which cleansing is to take place; and it is the object of the present invention to obviate this disadvantage by mounting the ball in a portable plug, which can be inserted into any of the cleansing holes after removal of the plug normally closing same.



Bosenius' Hydraulic-Main Cleanser.

The illustration shows a vertical section of the appliance (also a modification), a plan, and a cross section showing the appliance fitted to the main.

The hole A in the cover of the main has a ring D bolted round it, so as to form a coned seat for the plug F. This latter comprises parts G H, fixed together by screws and having concave-walled apertures forming a spherical seat for the ball L. The edges of the seat are bevelled to give increased freedom of movement to the rod M, which is slidably carried by the ball—the seat being, however, adequate to firmly hold the ball and also prevent any escape of gas from the main. The collar P on the rod enables the plug to be withdrawn, by pulling it from the main and thus lifting the ball and plug with it.

The aperture A is normally closed by an ordinary plug similar in shape to the plug F. This normal plug is removed for insertion of the plug shown, the conical shape of which "ensures a firm seat adequate

to prevent accidental displacement and escape of gas during the manipulation of the rod."

In the modification shown, the outer surface of the plug S, formed of the two parts Q R, is not entirely conical, but has at the top an annular flange, which rests on the cover of the main and is traversed by rivets holding the parts together. The seat for the plug is the wall of the aperture in the cover of the main. The ball W, carrying the cleaning rod, rests on the conical inner surface of the part Q, making a circular gas-tight joint at the central zone of the plug. The upper half of the ball is not closed, except to a slight extent by a conical surface of the part R, sufficient to prevent the withdrawal of the ball from the plug.

PARLIAMENTARY INTELLIGENCE.

GREATER LONDON RAILWAY BILL.

Opposition by the Brentford Gas Company.

The Committee of the House of Commons presided over by Sir JOSEPH COMPTON RICKETT had under consideration on June 14 and 16 the Greater London Railway Bill, opposition to the preamble of which was offered by the Brentford Gas Company.

Mr. BALFOUR BROWNE, K.C., Mr. ERSKINE POLLOCK, and Mr. TYLDESLEY JONES appeared in support of the petition.

Mr. *A. A. Johnston*, the Engineer and Manager of the Brentford Gas Company, in answer to Mr. TYLDESLEY JONES, gave particulars of the working of the Company since its incorporation in 1821. In 1868, owing to the increase in the Company's business, they found it necessary to go to Parliament for additional capital and for a new site. The capital was increased to £542,500; and they were given power to manufacture gas at Southall. In addition to this, the Company obtained the necessary land for a road at Southall, giving access to the main road near their new site. After the Act was obtained, the present works at Southall were commenced. In 1876, the Company secured some additional land at Brentford on which they erected retort-houses and stores. The whole of this land was now in use. It was quite impossible for them to extend their works at Brentford. In 1880, an opportunity occurred of acquiring further land at Southall; and the Company agreed to purchase an additional area of 41 acres adjoining their existing site. In 1881, the Company obtained power from the Board of Trade to manufacture gas on this site, and also on some adjoining land, which they had not purchased, but which was subject to their buying by agreement. At Brentford, the Company owned 5½ acres of land, upon only 1·970 acres of which were they empowered to manufacture gas. At Southall, they had 73½ acres, upon 53½ acres of which they had manufacturing powers. The Directors, in 1880, acquired all the land adjoining their then existing works, because they foresaw that they would very soon require a great deal more land for the purposes of gas manufacture. In 1880, the make of gas at Southall was 178 million cubic feet; in 1890, it was 419 millions; in 1900, it was 1008 millions; last year it was 1916 millions. So that they have had for the last ten years an increase of 89·9 per cent. in the production of gas at Southall. All future increases of production must take place there. The maximum output from both stations so far had been 12,215,000 cubic feet in one day—7,881,000 cubic feet from Southall. The capacity of the holders at Southall was 7,510,000 cubic feet.

In reply to the CHAIRMAN, witness expressed the opinion that the Company ought to commence to construct new gas-works within the next year or two. It would be necessary to add at least 50 per cent. of the present capacity of the Southall works within the next five or six years. There were 35 acres available for gas manufacture. About 5 acres of this were occupied with sulphate works; so that they had 30 acres available. Apart from the actual gas storing or gas making, the Company required ground for storage in proportion to the extension of the works. Practically the whole of the present land would be rendered inoperative by the Bill.

Replying to Mr. TYLDESLEY JONES, witness said that the construction of the railway would absorb a very large portion of the land on which they wanted to extend their works. The mains which carried the gas to the area of supply ran along a private road, which the promoters proposed to acquire. This would necessitate the diversion of the mains at very heavy cost.

The CHAIRMAN: Could not a tunnel be made giving access to your mains underneath the viaduct of the new Company?

Witness: Of course, it is possible; but it is very undesirable from our point of view.

In further examination, witness said the scheme of the promoters would entail a dislocation of the whole system of the Company's works. The private road which they proposed to take was used for the cartage of material, and was the only means of access to the works.

Cross-examined by Mr. J. D. FITZGERALD, witness said the surplus manufacturing capacity at Southall was about 10 per cent. over the present demand. With their present manufacturing plant, the Company could supply an additional 2 million cubic feet of gas per day. Plans had been prepared for the contemplated extension; but he had not got them with him. He admitted that the Company had a surplus of 29·8 acres of land for manufacturing purposes at Southall.

In re-examination by Mr. BALFOUR BROWNE, witness said the Gas Company wanted every inch of the land they possessed. It was not a question of compensation; they did not want the railway there at all. Any cutting up of the land would be a very serious matter, and would make the working far more difficult.

The CHAIRMAN: If you had more land given you, gas powers obtained, and full compensation for differences of height and foundation, would you be worse off?

Witness: We should if we had to take land any distance from the present works. We could not work as economically and satisfactorily as if they were all together.

The Committee adjourned at this stage. When the proceedings were resumed on the 16th inst.,

Mr. *Johnston* was recalled and further re-examined by Mr. BALFOUR BROWNE. He produced one of the plans he had prepared for laying out the land in the possession of the Gas Company for future extensions of their works. The sketch showed practically how the whole of the vacant land would be utilized. It was made before he heard of the present Bill. The sketch embodied the suggestions he made to the Company before he heard of the railway coming to Southall.

In cross-examination by Mr. FITZGERALD, witness said the object of the scheme was to double the capacity of the existing works.

The CHAIRMAN: I want to know where the piece of land is which you suggest would be a convenient place for an extension.

Mr. FITZGERALD: It is on the west side, and contains about 15 acres.

Witness: The area is a little over 14 acres. We occupy at present 6 acres for coal and coke storage. This leaves about 8 acres, which it is practically impossible to utilize for gas-works purposes.

In reply to the CHAIRMAN, witness said the Company's Brentford works were already much congested, and any increase in the Brentford area would have to fall upon Southall. In any case, he believed they would have to increase their works by 50 per cent. within the next five years; and assuming that the same ratio of increase continued, they would have to double their works within the next thirteen years. So that in this period practically the whole of the vacant land would be occupied.

In reply to Mr. FITZGERALD, witness said in the winter months the surplus capacity at Southall was about 2,000,000 cubic feet. In the summer months, it would be very much larger.

By Mr. BALFOUR BROWNE: Even with this margin, they would have to add 50 per cent. to their capacity within the next five years.

Mr. *Corbet Woodall*, examined by Mr. ERSKINE POLLOCK, said he had inspected the Southall works, and was of opinion that the proposed railways (Nos. 3, 4, and 5) would completely wreck the future of the Company. If the Bill were passed, and the Company were deprived of the lands they now possessed, they would have to come to Parliament for additional lands; and this application would doubtless be opposed. If railways Nos. 3, 4, and 5 were carried across the triangular piece of land shown on the map, the remainder of the land would be quite valueless, because it was wanted for sidings, and the shape would be quite unsuitable. There would be left a series of broken lands upon which gas-works might be built. But they could not be economical or convenient works; and therefore the Company and the gas consumers would be taxed for all time by reason of this ejection. The land which would be left could not be used with anything like the economy which would attach to a continuous site.

In reply to the CHAIRMAN, witness said in his opinion the railway could be more advantageously constructed on the vacant land on the other side of the canal. He believed the promoters now recognized that this would be at least as good a site as the one proposed. The business of the Gas Company was increasing at the rate of about 5 per cent. per annum. Their area was a superb one from a gas-maker's point of view.

In cross-examination with the object of showing that the damage by severance would be considerably less if the lines were carried on a viaduct with a headway varying from 12 to 17 feet, witness admitted this would minimize the damage. The viaduct would reduce the inconvenience in operating the works; but it would not reduce the inconvenience of setting out the works. He could not entertain the idea of building a portion of the works on the other side of the canal.

The CHAIRMAN having asked if any plan had been prepared of any alternative route, to avoid the gas-works,

Mr. BALFOUR BROWNE said there had been certain correspondence between the parties; but it was distinctly understood that it was to be without prejudice—at the request of the promoters. The final proposal was not to go through the gas-works at all, but to come for a Bill next year to deviate the line.

Witness, in re-examination by Mr. BALFOUR BROWNE, said the original plan showed the main line running right through the Southall Gas-Works. In an attempt to avoid this, the line was now put upon a viaduct, whereas in the original plan it was on an earthwork embankment. In his opinion, the injury to the works was just as great on the new plan as on the old one.

Mr. *C. S. Meik*, examined by Mr. BALFOUR BROWNE, said he had been through the plans of the proposed railway, so far as they affected the Brentford Gas-Works. In his opinion, if the scheme were carried out as proposed, the whole of the land belonging to the Gas Company east of the existing works would be rendered useless for further extension. The promoters could have laid down a much better line at less cost without in any way interfering with the Gas Company's land.

Mr. BALFOUR BROWNE then proceeded to address the Committee on behalf of the Brentford Gas Company. He asked them, whatever they did with regard to the rest of the line, to reject railways Nos. 3, 4, and 5. The promoters had behaved very improperly to the Gas Company. They knew quite well that, when they proposed to come through the gas-works in 1906, the Company opposed. They knew the petitioners had proposed a deviation of the line; but without consulting the Gas Company, or coming to them in any way, they went and laid out their line exactly as they had done in 1906. He asked the Committee to say that, so far as these lines were concerned, the preamble was not proved. Let the promoters come for a deviation next year; and so far as the Gas Company were concerned, they would offer no opposition to the acquisition of land which was not gas land. He would then ask for nothing beyond proper compensation for the loss of the land.

Mr. FITZGERALD replied on behalf of the promoters. With regard to the opposition of the Brentford Gas Company, the promoters admitted that the Company stood in a special position; and the promoters were very desirous to meet their opposition in any possible way—at any rate, to meet it so as to minimize the amount of damage that could be done to the carrying on of their undertaking whenever it was necessary to extend their works. If this line was to be made within the limits of deviation, they must take a small quantity of the Company's land. One difficulty, of course, would be damage by severance; but the promoters minimized this to a very large extent—so

much so as to do away with it altogether, except so far as the laying out of the works was concerned—by constructing the line upon arches. It could not be taken as at all equivalent to the severance which they had at present, by which their land was split in two by a considerable amount of land belonging to other owners, and which for thirty years petitioners had never made any attempt to acquire. The promoters desired to meet the Gas Company in every reasonable way, short of stopping the line; and the fact that a small portion of gas land—8 acres out of 73 acres—was proposed to be taken, was not, he submitted, sufficient reason for stopping a line of great public utility.

The CHAIRMAN, in giving the decision of the Committee, said they were unanimously of opinion that the preamble was not proved in so far as it related to the line from Northolt to Feltham, which involved at Southall a very troublesome junction and the appropriation of the gas-works land.

ABERAVON GAS ORDER.

The Local Government Provisional Order (No. 3) Bill, which embodies the Aberavon Gas Order, was on Tuesday last before the Committee of the House of Commons presided over by Mr. MOONEY. The Order asked for borrowing powers. In the present session, the Margam Urban District Council are promoting a Bill for the authorization of the manufacture and sale of gas within their own area—at present supplied by the Aberavon Corporation. This Bill is now in the House of Lords; but when in the first House, it was opposed by the Aberavon Corporation.

Mr. WEDDERBURN, K.C., appeared on behalf of the Aberavon Corporation, the promoters of the Order; while Mr. VESEY-KNOX, K.C., and Mr. HUTCHINSON, K.C., represented the Margam Council.

Mr. WEDDERBURN observed that he understood the whole point of the present proceedings was a question of amendment.

Mr. VESEY-KNOX said that was not so. He wished the Order to apply only to the borough of Aberavon.

Mr. WEDDERBURN said the Committee could not so restrict the Order. Before Margam were ready to take over the transfer, eighteen months or two years might elapse. Were the Aberavon Corporation to spend no money on the undertaking during this interval? They would be absolutely paralyzed in Margam straight away. The position would be an absurd one. There was also the objection that the Margam Bill might not get through the other House, in which case, the Order having been restricted, an almost impossible situation would arise. If the Order went through as it stood, the Corporation could not raise a penny without going to the Local Government Board, who would want to know what the real requirements were. The Local Government Board would be a sufficient check in this matter; and he asked the Committee to put a figure for borrowing in the Bill. All he was anxious about was that the Committee should do nothing which would create an *impasse* eventually, as by the insertion of the words "within the borough." They wanted to keep their Order intact in the event of the Margam Bill not going through.

Mr. *A. J. Bond*, the Gas Manager to the Aberavon Corporation, said the original application to the Local Government Board was for a loan of £10,000; the undertaking having then £1600 on hand. It was at the suggestion of the Local Government Board that no specified sum was put into the Order. In the next ten or fifteen years, there would probably be in Aberavon alone an increase of 400 new consumers, 750 new slot consumers, and some 200 additional street-lamps. Keeping these considerations in mind, the undertaking would need an additional £8750 during this period.

In cross-examination by Mr. VESEY-KNOX, witness said they expected to get very little in Margam in the extension of mains in the next year, if any at all. For ordinary meters, there would probably be £300 or £400, and prepayment meters might come to £250 or £300. If the Margam Bill became law, he did not see that they would have any necessity to borrow any money at all in addition to the £1600 they had already borrowed, and having regard to the Margam purchase.

Mr. VESEY-KNOX contended that there was no necessity for this Order on the evidence produced. In the event of the Margam Bill becoming law and the purchase being carried out, the Corporation for fifteen years at least would require no additional powers. The large capital sum they would receive for their undertaking in Margam would be sufficient to meet all they required. There was a great necessity in Margam of not allowing the Aberavon people at the last moment to spend a large sum of money, perhaps unwisely, on the Margam undertaking for the purposes of affecting the arbitration price. He suggested that the only way of meeting the situation was that the borrowing powers should be confined to what was necessary for the purposes of their undertaking within the limits of their supply other than that in the district of Margam. He was ready to undertake, on behalf of his clients, that if in the other House the Margam Bill was unsuccessful, then they would not oppose the deletion of the words he now suggested, on condition that the Glasgow clause was inserted, and that the price in Margam was the same as in Aberavon.

The Committee decided not to confirm the Provisional Order.

Uxbridge Gas Company's Provisional Order.—The Uxbridge Gas Company having failed to obtain the consent of the Hertfordshire County Council to their application for a Provisional Order, the Board of Trade held an inquiry into the matter at their offices. It appeared that the Council withheld their consent owing to the refusal of the Company to agree to the insertion in the Order of a special clause for the protection of the roads and bridges under the control of the Council, and that a clause had been inserted in the Draft Order extending to the Council the protection already afforded to the Middlesex County Council by the Uxbridge Gas Act, 1906. In the circumstances, the Board decided not to depart from their usual practice of only inserting protective clauses in extension of the provisions of the General Acts in cases where the parties are in agreement; and they made the Order accordingly.

MISCELLANEOUS NEWS.

SWINTON GAS PURCHASE ARBITRATION.

First Day's Proceedings.

Arbitration proceedings were commenced last Tuesday, at the Surveyors' Institution, Great George Street, Westminster, to determine the price to be paid by the Swinton and Mexborough Gas Board for the undertaking of the Swinton and Mexborough Gaslight Company. The proceedings arose out of an Act of 1909, under which a Gas Board for the two urban districts named was established, and obtained power to acquire the undertaking of the Gas Company.

The Arbitrators were Mr. CORBET WOODALL, for the Company, and Mr. HARRY E. JONES, for the Gas Board. Mr. A. J. RAM, K.C., acted as Umpire.

The Hon. J. D. FITZGERALD, K.C., and Mr. F. N. KEEN (instructed by Messrs. Baker and Co.) appeared for the Company; while Mr. HONORATUS LLOYD, K.C., and Mr. VESEY KNOX, K.C. (instructed by Messrs. Lees and Co.), represented the Board.

THE CASE FOR THE COMPANY.

Mr. FITZGERALD, in opening, gave a short sketch of the history of the undertaking, which he said was established in 1856 under a deed of settlement. The capital was £9500, divided into 1900 shares of £5 each. In 1872, the Company obtained a Provisional Order; and under this Order they had power to raised aditional capital of £10,000 in £5 shares, and also borrowing powers to the extent of £6000. The new capital was to bear interest at the rate of 7 per cent.; and the old capital 10 per cent. The district which the Company supplied was that of the two District Councils and an area outside—about 3000 acres in all, with an increasing population of about 30,000. In 1908, the Company obtained an Act, under which it was dissolved and reincorporated as a Statutory Company with the usual powers. The capital was fixed at £44,500 in £5 shares, of which £19,500, called the original capital, was to consist of ordinary shares "A" and "B," to be substituted for the existing capital of the old Company, and £25,000 additional capital. Then the Company, after having been a maximum dividend undertaking before, became a sliding-scale Company. The standard rates of dividend were 10 per cent. on the "A" shares, 7 per cent. on the "B" shares, and 7 per cent. on the additional capital. The standard price was 3s. 6d. per 1000 cubic feet. The actual prices in 1908, and now, were 3s. 6d. per 1000 feet to ordinary consumers, and 3s. 4d. to large users of gas. There was also a purchase clause inserted, which enabled the two Councils, if they thought fit, to apply in the next session of Parliament for an Act to acquire the undertaking—the Company not to oppose, except as to details, and to protect their interests. Accordingly, in 1909, the Councils obtained the Act under which the arbitration was being held. Among the provisions to which he called attention was section 27, which he pointed out was not an ordinary one. It was: "All debentures, mortgages, obligations, debts, and liabilities of the Company other than on revenue account existing at the date of transfer shall be paid and satisfied by the Board, but subject as between the Board and the Company to sub-section 2 of this section, and to the section of this Act the marginal note whereof is 'Maintenance until Transfer.'" Sub-section 2 read: "Not less than fourteen days before the commencement of any arbitration for determining the purchase price for the undertaking of the Company, the Company shall furnish to the Board a statement of all such debentures, mortgages, obligations, debts, and liabilities of the Company then outstanding so far as the same can be ascertained. And all obligations, debts, and liabilities (if any) of the Company incurred before the date of the award which are not included in such statement or in any amendment thereof notified to the Arbitrators or Umpire before the date of the award, shall as between the Board and the Company be paid by the Company." The maximum price for gas that could be charged by the Board under their Act was to be 4s. per 1000 cubic feet. The undertaking to be transferred was a prosperous and progressive one. During the last fifteen years, the maximum dividend of 7 per cent. had been paid on the "B" shares and the maximum dividend of 10 per cent. had been paid on the "A" shares, except in two years. Until quite recently, it had been the custom of the Company to pay income-tax as well. If the income-tax was reckoned in, and also the appropriations to reserve, the Company had been in a position for the last thirty years to pay the maximum dividends provided by the Order of 1872. There was some check to the prosperity of the Company in the years 1904 and 1905, owing to the opening of an electricity undertaking in Mexborough, in the hands of the Council. The Council did what local authorities very frequently did—they substituted electricity, which was in their own hands, for gas for the public lighting of the district, though, in fact, the gas lighting was considerably cheaper. At that time, also, owing to the opening of the competing undertaking, a considerable number of consumers in Mexborough were lost. This loss, however, had now been recovered, and a much larger profit was being made than was the case then. He would now hand in the agreed tables.

Mr. HONORATUS LLOYD: There have been two tables agreed between us—one which excludes the year 1910, and the other which includes it. I am going to contend that, under the Acts, the year by which the Court will have to be guided is 1909. I object to the figures for 1910 being put in as the basis of calculations you have to make.

Mr. FITZGERALD: I am perfectly prepared to argue the question, and I think I can show from every point of view, that the figures of 1910 are admissible in evidence.

Mr. HONORATUS LLOYD: I am not going to object to my learned friend going into the 1910 figures for certain purposes. I think it is right they should be before you for those purposes. But I am going to object to them being taken as the basis for the necessary calculation, for this reason: Inasmuch as I am by the Act to repay him the capital that he has spent since the matter came to a crisis, I want to protect

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myself against paying him a sum which will represent income earned by the capital which has been expended since, and also repaying the same capital. I do not want to find the capital, and also the income earned by my capital.

Mr. FITZGERALD remarked that his learned friend did not want to pay twice over; and he would not be asked to do so. Continuing, he said that in 1903 the quantity of gas sold was 37 million cubic feet; and in 1905, it fell to 26 millions. The figure for 1907 was 28 million cubic feet. By 1910, it had risen again to 35 million cubic feet; and there had been a further considerable increase during the first quarter of this year. The district was situated right in the heart of the South Yorkshire coalfield and on the coal measures; and while this was a great advantage, inasmuch as it enabled coal to be procured cheaply, it also had the disadvantage that subsidence was going on, and there was an abnormal amount of leakage as compared with an ordinary undertaking. In 1900, the percentage of unaccounted-for gas on the make was 35½, and in 1905 it was 41·68; but by 1910 it had fallen to 26·32. As a matter of fact, in 1905 the make was 53 million cubic feet in round figures; but the total sale of gas was only 29 millions. In 1910, however, the total make was only about 50½ million cubic feet; while sales had gone up to over 35 millions. So that, with a smaller output, they were selling some 6 million cubic feet more gas. Another great improvement in the working of the Company was that the amount of gas made per ton of coal carbonized had enormously increased. In 1905, the make per ton was 9499 feet; but the figure had risen until in 1910 it was 12,300 cubic feet. This improvement had been brought about by a reconstruction of the retorts. The result was that both the gross and the net revenue of the Company had largely increased within the last four years. Taking the period from 1905 to 1910, it would be seen that the income for the first three years was practically speaking constant—about £5300. Then it went steadily up, until last year it was £6702. The profits had gone up similarly. With regard to the works, they were well situated in the centre of the district, alongside the canal. They were also quite close to the railway; and there was ample land for extensions. There were two holders, of which the larger one only had been used for the last nine or ten years—it being sufficient for present requirements. Owing to the subsidence of the land, there was a list in the tank of the holder; but the working of the holder had not been interfered with in any way. The subsidence had stopped; and there had been no increase in the list for more than a year past. It was a single-lift holder. The legal position with regard to the matter appeared to be this: The land in question was bought by the Gas Company from the Manchester, Sheffield, and Lincolnshire Railway Company, who had purchased it from Lord Fitzwilliam, who was the original owner; and in the conveyance from Lord Fitzwilliam the minerals were reserved. But the land in question was not within the 40 yards limit mentioned in the Railway Clauses Act; and accordingly the provisions of that Act about the working of coal did not apply. Thus the holder was erected on land where the minerals belonged to another owner, but that owner had no right to let down the land; and so, if any substantial damage was suffered owing to the land subsiding, it could be recovered from the mineral workers. In the last few years the number of consumers had been rapidly increasing owing to the introduction of prepayment meters. The number of consumers in the year 1904 was 1330; while in 1910 there were 2680 consumers—1404 ordinary and 1276 prepayment. There was, however, room for a considerable increase of income, because there were about 3500 houses at present in the district that were not supplied with gas; and it was reasonable to expect that from 1200 to 1500 of them would become consumers. Accordingly, the increase of income which had been going on would be continued in the future. As to the valuation of the undertaking, the position was this. The standard rates of dividend on the 10 and 7 per cent. capital came to £1650. In the current year, the income would be sufficient to decrease the price of gas by 4d. per 1000 cubic feet and increase the dividends to 11 per cent. on the £9500 of "A" capital, and to £7 14s. per cent. on the £10,000 "B" capital; and this would represent an annual income of £1815. Not only would the income be sufficient to produce this divisible revenue, but it would still leave a substantial surplus to be carried over to the following year, because no additional share capital had been issued under the Act of 1908, and any money that had been required had been met by an overdraft on the bankers. Accordingly, the Company proposed to take this net figure of £1815 as the net maintainable income—the income to be capitalized. The next thing to be fixed, of course, was the number of years' purchase. In arriving at this, it was necessary to take into account that, owing to the improving nature of the business, the income was unusually well secured, and that if the undertaking had remained in the hands of the Company a larger income would certainly have been earned in succeeding years. Having regard to these matters, and also to the fact that this was a compulsory purchase, the Company proposed to take 28½ years as the multiplier; and this applied to £1815 revenue, brought out a total of £51,727. Adding 10 per cent. for the compulsory purchase, they arrived at a sum of £56,900, which was the amount of the claim as the value of the undertaking. Then, under section 27 of the Act of 1909, it was necessary to add to the amount of the award the liabilities of the Company existing at the date of transfer, other than liabilities on revenue account. Under section 21, the Board had also to pay to the Company the costs of obtaining the Act of 1908 as taxed between solicitor and client; and the amount of these taxed costs was £2630. The Board had also to pay the costs of winding-up; but these two matters need not be taken into account in the arbitration.

Mr. *William B. Keen*, examined by Mr. F. N. KEEN, said he had examined the accounts under the instructions of the Company; and in conjunction with Mr. Cash, on behalf of the Board, he had prepared certain tables, which had been referred to by Mr. Fitzgerald in his opening. The capital expenditure to Dec. 31, 1910, was £34,423; and he had added a note at the bottom, "No adjustment has been made on the above account in respect of any disused plant; and the Gas Company do not admit any adjustment.

Mr. HARRY JONES: Does that mean that when they have pulled down old plant, and put in its place new plant, there has been no allowance for the value of the old plant already in the capital?

Witness: Yes; that is so.

Examination continued: The amount of capital expenditure in excess of capital raised to Dec. 31, 1910, was £8923. At the request of Mr. Cash, he had added a note to the tables, "No charge has been included in the above expenditure in respect of depreciation of meters and stoves. The method of dealing with meters and stoves in the account had been that any meters or stoves that were entirely new had been charged as capital expenditure, but any that were in replacement of old ones had been charged to repairs and renewals. This had been the regular practice of the Company for many years; and he thought it was a proper and usual method. He did not himself see any necessity for bringing any depreciation into the accounts in addition to this. He took it that the essential thing to see was that sufficient expenditure was incurred in each year to properly maintain the undertaking; and this being done, no further charge by way of depreciation was necessary.

Mr. CORBET WOODALL: Will Mr. Keen explain how he applies this to the answer he gave to Mr. Jones, that when plant or works are discontinued, no depreciation of capital takes place?

Mr. F. N. KEEN: In those cases where plant is discontinued which has been used before, how would the charge actually be apportioned in the accounts of the Company?

Witness: It has been apportioned in those cases on a careful computation made by the engineers of the improvement, or what may be taken to be the actual addition to the plant. For instance, there is an item of £385 in the balance-sheet carried forward in suspense, in connection with the reconstruction of retorts. In this case, in 1909, a sum of £385 was charged to revenue. The contract was entered into for the reconstruction, improvement, and enlargement of the retorts; and in respect of the whole of this contract, one-third was charged to capital and two-thirds to revenue.

The UMPIRE: Supposing any part of the works had cost £100, and ultimately became worn out and was replaced by works costing £150, what would happen in that case?

Witness: The principle in that case would be to charge £50 to capital and £100 to revenue. That is the principle which purports to have been applied by the Company. The provision for depreciation, in fact, is made by charging the replacement to revenue. I intended simply to say that there was no specific item for depreciation, but it was dealt with in this way.

In further examination, witness was taken through the various items in his tables. He stated that, under the Act, the prepayment consumers paid an additional 8d. per 1000 cubic feet. In 1905, 1907, and 1908, a sum was transferred from the reserve fund for the purpose of making up the dividend; and in 1906, 1909, and 1910 there was a surplus profit beyond the sum needed for the dividend. The accumulated surplus on profit and loss account was £1267 in 1906; and now it was £2021. In 1910, after payment of dividend and interest, there was a surplus revenue of £374. The reserve fund in that year stood at £2861. The reserve fund was wholly used for working capital; it was not invested. The sales of gas in the first quarter of the present year showed an increase of 12 per cent. as compared with the same quarter of 1910. The total length of mains was 20 miles 665 yards.

Cross-examined by Mr. HONORATUS LLOYD, witness said the sum spent on meters for the last four years was £3157. This was about two-thirds of the amount spent on meters and charged to capital account since the year 1872. The remaining expenditure was all charged to revenue. The large amount spent during the past four years was, of course, due to the installation of prepayment meters. It was agreed with the makers that payment for some of the meters bought should be deferred. No interest was charged for this. The Board would take over the meters; and naturally they would have to pay for them. He was not aware whether the price was unduly high on account of the long credit given. Others were paid for out of the overdraft.

Mr. HONORATUS LLOYD: As far as the outstanding account has been paid, and paid out of the overdraft, the undertaking is charged with the interest; but as far as the account has not been paid at all, the undertaking is not charged with interest?

Witness: That is so.

It is common ground here that the first lot of meters was bought and not paid for, and the second lot was bought and paid for; and as far as the money is borrowed from the bank interest is charged, and I get the benefit of it. As far as the other meters have not been paid for, I still have to pay for them; but I get no credit for interest. So that by going to the manufacturer they get out of the obligation to give me credit for interest they pay; whereas if they go to the bank there is the interest?—But if we had prepaid, we should have got a discount for them.

Further cross-examined, witness said there was nothing in the accounts to indicate that the money for the payment of dividends had been secured by starving the works. On financial grounds he saw no reason why the Company should refrain from spending money on maintenance and repairs because of the state of their bank account, inasmuch as their credit at their bankers was perfectly good.

Mr. HARRY JONES: They could not pay dividends out of what they borrowed from the bank.

Mr. CORBET WOODALL: But you can borrow from the bank to pay dividends, which comes to the same thing.

The UMPIRE (referring to the point about the deferred payment for meters): I suppose the contention is that, had these meters been paid for out of the overdraft from the bank, the Company would have had to pay interest to the bank, to which interest the Board will now be entitled?

Mr. HONORATUS LLOYD: Yes.

Mr. FITZGERALD: I quite accede to the suggestion that, if the amount has not been paid, inasmuch as it is one of the liabilities that the purchasing Board have to take over, we must, in making our valuation, make an allowance in respect of interest on that, to be taken off the price. You will find that this has been done, and that a sufficient sum has been allowed for the purpose.

Mr. *E. H. Stevenson*, examined by Mr. FITZGERALD, said he had thoroughly inspected the works, and had made a structural valuation of them and of the distributing apparatus. The total came to £35,998.

The area of the works was about 2½ acres; and there was ample room to meet future requirements. The reason for reconstructing the retort-benches was that the cellar was too deep down in the ground, and was liable to be flooded sometimes with land springs and at others from the canal It was thus quite impossible to heat the retorts properly. Therefore the floor had been raised 2 feet, so as to bring the retort-bench quite out of the damp. The passages underground had been widened, the charging-floor raised, and entirely new benches put in. The result was shown in the carbonization. Instead of making approximately 9500 cubic feet per ton from the very best coal that could possibly be had, they were now making 12,300 to 12,500 cubic feet. The retort-house held twelve settings of six retorts; and eight had been reconstructed. The new benches would easily make 336,000 cubic feet a day; and the maximum day's make at present was 234,000 cubic feet. Thus there was ample retort power for several years to come. As to the holder which had a list, there had never been the slightest leak in it; and he did not see how any could occur, even if the cast-iron tank cracked, as it was in the solid clay. He believed the holder had settled into its final position. The mains were nearly all of cast iron; and a number of them were of small diameter. One-third of them were under 3 inches. The pressure over the district, however, was ample. In an undertaking of this size, he would have expected to find a larger consumption per mile of main. Not half the houses in the district at present had gas, though they were nearly all on the line of mains. When they were connected up, of course, the consumption per mile of main would rise. If the Company had remained in control of the district, there was every probability that they would have increased the consumption of gas. In fact, without putting on any consumers worth speaking of, the consumption had increased by 1,117,000 cubic feet during the first quarter of the present year. The quantity sent out, however, was about 200,000 cubic feet less than the additional sales; so that the leakage was being brought down still further. The unaccounted-for gas was beyond the ordinary, as was always the case in mining districts; but this was a matter which the Company had taken very seriously in hand. In 1901, they lost 95 per cent. more than they did in 1910. He had prepared two tables—one referring to undertakings selling less than 2 million cubic feet of gas per mile of main, and the other to works above this figure—showing the gas lost and price at various places on the coal measures. The average loss of gas of fifteen works selling less than 2 million cubic feet per mile was 25·8 per cent., compared with Swinton and Mexborough's 26·3 per cent.; while the average of twenty concerns selling over 2 million feet per mile was 19·1 per cent. Of course, different coal measures and depths of working acted differently upon the surface of the ground. In some places the ground was not nearly so much disturbed as in others. Having regard to the position of this undertaking, he felt sure that the reduction in the percentage of unaccounted-for gas would go on. With the present mains, he would expect it to get down to 15 per cent. The majority of the consumers here were very small ones—94½ per cent. were five-light and under. Nearly one-half of them were prepayment consumers. While the cost of supplying gas to small consumers was larger than that of supplying large ones, it was advantageous to the Company to have a number of small customers, because they did not leave an undertaking, as large consumers often did. The income from this undertaking was very well secured indeed. As far as the works themselves were concerned, there would not be any necessity for new capital expenditure till there had been an increase of some 30 or 40 per cent. in the consumption. It might be advisable to put in another exhauster. With regard to the deductions or alterations he had thought it fair to make in arriving at the maintainable income, certainly more than was necessary had been spent during the last two years on repairs and maintenance, taking it over the average of years. There was no machinery at the works except two gas-engines; and everything was as solid and as simple as it could be. So there was no reason why there should be heavy expenditure. In 1910, the total amount for repairs and maintenance of works was 4·73d. per 1000 cubic feet of gas sold. In a table of amended profit for the year 1910, he started with the profits shown in the accounts, £2722; and to this he added £250, which was the difference between the expenditure on the works that year and the average of six years. In 1910, the total, as he had said, was 4·73d. per 1000 cubic feet sold; and the average for the six years, which he thought was about right, came to 3·02d. This was for the works only. He left the figure for stoves, mains, services, and other things, as it was. He then added £277 for errors in quantity of tar and liquor made, £40 additional allowance to the Directors that year, £18 gratuity to an old servant, and £29 for a week's wages—the Company having had 53 pay days in 1910. This made his amended profit for the year £3337. In his opinion there had been a considerable error in stock-taking with respect to the quantity of tar and liquor. In 1910, the tar and 10-oz. liquor brought into the revenue account dropped respectively to 5·66 and 9·49 gallons per ton of coal. The amounts brought into the revenue account for 1909 were: Tar, 13·38 gallons per ton; 10-oz. liquor, 14·44 gallons. Taking the whole of Yorkshire, as far as could be ascertained, the make of tar per ton was 12·3 gallons. Therefore he thought if they took 11 gallons here, they would be, if anything, rather under the mark. It must have been made, though it was not brought into the accounts. At these works, so far as he could trace it back, the tar came to practically 11·5 gallons per ton; and he could see no reason why it should alter suddenly in one year, unless it was due to error in stock-taking. It was difficult to take stock. Both the tar and liquor were in an old gasholder tank. Then he took 20 gallons of 10-oz. liquor per ton as the right figure.

Mr. HARRY JONES: Do they carry over a very large stock?

Witness: We show stocks here of 125,000 gallons of tar and liquor.

That is a very absurd stock for a Company such as this to carry over?—Of course, it is.

Further dealing with the matter, witness pointed out that his alteration in the profits under the head of tar and liquor made the receipts for these two items, per 1000 cubic feet of gas sold, 3·74d., as against an average of 3·9d. for eight Yorkshire undertakings. He did not, however, think this was a fair way to take it. It should be calculated per 1000 cubic feet of gas made, because the quantity of gas lost by the eight undertakings was under 5 per cent., while at Mexborough the amount lost and used was just over 30 per cent. If the calculation was on the quantity of gas made, the average of the eight undertakings was 3·71d. per 1000 cubic feet; and the amount claimed for Mexborough was 2·6d.—or less per 1000 cubic feet of gas made by rather over 1d.

The hearing was at this stage adjourned.

MANCHESTER CORPORATION GAS UNDERTAKING.

The Annual Accounts.

In the last number of the "JOURNAL" (p. 932), we gave the principal portions of the annual report of the Gas Committee of the Manchester Corporation. The following are some extracts from the accounts.

REVENUE ACCOUNT.

INCOME.

Gas-rental—		
Ordinary meters		£494,695 16 4
Prepayment meters		81,795 15 6
Public lamps		40,669 5 5
Residual products—		
Coke	£98,657 16 7	
Tar	33,306 19 2	
Sulphate of ammonia	40,455 7 9	
		172,420 3 6
Rents of cottages, &c.		1,014 16 9
		£790,595 17 6

EXPENDITURE.

Manufacture—		
Cannel, coal, and oil (including cost of unloading, &c.)	£270,630 6 9	
Coke, water, &c. (carburetted water gas)	10,003 12 10	
Carbonization (wages)	40,490 8 9	
Retorts, fire-bricks, &c.	7,500 19 8	
Repairs and maintenance of works, &c.	41,113 6 9	
Salaries of Engineer and works staff (less proportion transferred, £1998 5s.)	7,196 13 9	
	£376,935 8 6	
Less received for spent oxide in excess of cost of purification	125 10 6	
	£376,809 18 0	
Provision for renewal of works plant (less £1269 17s. 11d. charged to sulphate of ammonia)	29,325 0 0	
		£406,134 18 0
Distribution—		
Repair and maintenance of mains, services, meters, and stoves	£34,751 6 11	
Salaries (less proportion transferred, £650)	27,442 8 10	
	£62,193 15 9	
Provision for renewal of distribution plant	46,828 0 0	
		109,021 15 9
Rents, rates, and taxes		57,800 6 8
Management—		
Salaries	£16,412 6 9	
General charges	5,949 14 8	
		22,362 1 5
Law and parliamentary charges		1,017 19 0
Subscriptions, donations, &c.		3,286 1 0
Bad debts		851 17 5
		£600,474 19 3
Balance carried to profit and loss account		190,120 18 3
		£790,595 17 6

The accounts are followed by the usual appendices, furnishing particulars in regard to the progress of the undertaking.

Appendix A is an abstract of the capital, revenue, and profit and loss accounts. It shows (*inter alia*) the amount of gross profit made from the gas undertaking, and the mode of its appropriation, also the amount of borrowed money owing, excess of assets, &c., from March, 1891, to March last. The figures for the past financial year are as follows: Gross profit, £191,473; net profit, £143,885; contributed to the sinking fund for redemption of debt, £71,559; paid over for improvement purposes and city fund, £46,560; applied in extension of works, £11,418; borrowed money owing, £1,208,141; excess of assets, £1,869,779. From June 24, 1843, the date when the works were taken over by the Corporation from the Commissioners of Police, the gross profits on the gas undertaking have amounted to £6,421,040, out of which £1,562,246 has been paid for interest—leaving a net profit of £4,858,793. Of this total, £1,608,288 has been placed to the sinking fund, £2,685,883 has been handed over to the Improvement Committee and added to the city fund, £329,201 has been paid for street lighting (making £3,015,084 used in relief of rates), and £230,518 applied to extensions of works.

Appendix B is a comparative statement of the gas transmitted from the works in the daytime and during the twenty-four hours, for the past two years. Summarized, the figures are as follows:—

	Daytime. Cubic Feet.	Twenty-four Hours. Cubic Feet.
Year ended March 31, 1911	1,905,269,000	5,663,570,000
Do. Do. 1910	1,842,103,000	5,565,414,000
Increase	63,166,000	98,156,000

	Cubic Feet.
Gas transmitted from the works	5,663,570,000
Do. accounted for	5,565,414,000
Loss (by condensation and leakage)	183,397,000 or 3·23 per cent.

In Appendix C, particulars are given as to the results of the working from March 31, 1891, to March 31, 1911. The table contains statistics as to the number of tons of coal and cannel carbonized, the total make of gas, the percentage unaccounted for, the yield per ton of coal, the illuminating power of the gas, the quantity of residual products, &c., each year in the above-mentioned period. The particulars for the past financial year are as follows: Coal and cannel carbonized, 498,709 tons; gas made, 5,659,844,000 cubic feet; yield per ton of coal carbonized, 11,349 cubic feet; illuminating power, 17·20 candles; quantity sold, 5,416,013,000 cubic feet; quantity sold per ton, 10,860 cubic feet; percentage of output unaccounted for, 3·23; coke for sale, 218,466 tons; do. per ton of coal, 10·45 cwt.; make of tar, 27,231 tons; do. per ton of coal, 11·72 gallons; ammoniacal liquor (10-oz. strength) made, 12,208,717 gallons; do. per ton of coal, 29·20 gallons; sulphate made, 4467 tons; do. per ton of coal, 23·93 lbs.

Appendix D shows the number of stoves and of each size of meter in use during the year in the city and out-townships. At the close of the past financial year, there were 49,262 stoves within, and 4468 beyond, the city—together 53,730, compared with 45,758 and 4190 (together, 49,948) at the corresponding date in 1910; so that there was an increase of 3782. The number of meters in use was 181,356 in 1911 and 178,490 in 1910. There was last year a net increase of 2866 on the number for the preceding year. The number of prepayment meters in use on March 31 last was 63,663—an increase of 2617.

From Appendix E, we learn that the gas-mains laid last year within the city extended to 22,565 yards, and beyond the city to 2698 yards; being 14¼ miles and 183 yards. The mains taken up were 5762 and 396 yards respectively—a total of 6158 yards, or 3½ miles and 438 yards. The total net increase during the past year, therefore, was 19,105 yards, or 10¾ miles and 185 yards. The total length of mains on March 31 last was 1,669,217 yards, or 948¼ miles and 297 yards.

SALFORD GAS CHARGES.

Labour Councillor's Plea for a Reduction in Price.

The Salford Town Council met specially on Wednesday last for the purpose of levying the rates for the financial year ending March next. The rate is 6s. 9d. in the pound—a reduction of 2d. on last year.

Objection was taken to the proposed rate by Mr. Purcell, one of the Labour members, on the ground that it was based on profits the Council were proposing to make out of gas consumers, and especially those who used prepayment meters. He said he was strongly opposed to granting a reduction in rates to people who were not entitled to it. It was proposed to relieve a large section of the ratepayers while still continuing to extort some £12,000 from the poorer classes of the community. He did not think they should levy the new rates until some concession in the matter of gas charges had been made to the people. Mr. Purcell proceeded to argue that the prices of gas in Salford were too high, and said that in nine-tenths of the towns and districts of England where gas was used, the tendency was towards a reduction. In Salford they had increased these charges because they were dependent upon them to get an additional surplus, in order to reduce the rates of people who were better off; and he could only describe the attitude adopted as "a continuation of a diabolical fraud on the poor section of the people." Mr. Bescoby declared that the position was "economically false;" and Mr. Johnson, in making a strong protest against the present charges, maintained that the Council were considering the ratepayers rather than the poor people. By 24 votes to 7, the Council approved of the rates as submitted.

HEREFORD CORPORATION GAS UNDERTAKING.

Annual Report and Accounts.

The Gas Engineer and Manager of the Hereford Corporation (Mr. W. W. Townsend) has presented to the Gas Committee his report for the year ended the 25th of March. He states that during the year the increase in the sales of gas amounted to 7½ million cubic feet, of which the ordinary consumers took more than 4 millions and the prepayment consumers upwards of 3 millions. This extra quantity was provided without carbonizing more coal; the yield of gas having been increased from 11,540 to 12,054 cubic feet per ton. Stated in another way, this means that had the yield of gas not increased, 656 tons more coal would have been required, the net cost of which, less residuals, would be about £328. The gas sold per ton of coal reached the record figure of 11,278 cubic feet; and the unaccounted-for gas was reduced from 5·9 to 4·8 per cent. The yield of residuals was practically the same as in the previous year, except that there was an increase in the quantity of tar made. The markets for residuals having been favourable throughout the year, the receipts under this head show a substantial increase—viz., £422 on coke, £127 on tar, and £223 on sulphate of ammonia, or in all £772. Against this, however, has to be set the increased cost of coal, £260, due to the higher prices which had to be paid on the new contracts. The expenditure on works and plant was again very heavy. The revenue from the sale of gas to ordinary consumers was only £172 down; the increased consumption having nearly made up for the reduced price which took effect last September. The revenue from prepayment meters (gross) was £542 more. But £230 was spent on special pendants and incandescent burners, in addition to the ordinary maintenance charges; so that the net increase from this source was £425. The gross profit for the year was £3934, against £4107, which, considering the reduced price of gas and the extra expenditure for the year, Mr. Townsend says is better than had been anticipated. Included in the revenue account, which consists of accumulated profits from past years, are two considerable items of expenditure—viz., new coal-store, £533; and high-pressure scheme, £300. Mr. Townsend reminds the Committee that they are in an almost unique position in having up-to-date works and plant, including 35 miles of mains, and capable of supplying 180 millions a year, and with an outstanding capital of only £26,000, including £11,500 invested in slot installations. They have always paid for new meters, cooking-stoves, and gas-fires out of revenue; and now the capital account has been closed entirely.

Appended to the report are statistics of the working for the past and the preceding year. The quantity of coal carbonized was 12,243 tons, and the gas made (as per station meter) was 145,174,000 cubic feet, or at the rate (corrected) of 12,054 cubic feet per ton, compared with 11,540 cubic feet in 1909-10. The gas sold was divided as follows:—

	1910-11.	1909-10.
Ordinary consumers . . .	87,584,500 cub. ft.	83,377,300 cub. ft.
Prepayment	25,983,300 ,,	22,907,740 ,,
Contracts	9,388,930 ,,	9,430,670 ,,
Public lamps.	13,756,000 ,,	13,528,200 ,,
Used on works	1,364,500 ,,	1,283,500 ,,
Total accounted for . .	138,077,230 cub. ft.	130,527,410 cub. ft.

The revenue from the sale of gas and meter-rents last year was 2s. 6·6d. per 1000 cubic feet of gas sold, compared with 2s. 7·4d. in 1909-10; and the cost price of gas, after deducting the receipts from residuals and the profit on stoves and fittings, was 1s. 11·2d., against 1s. 11·8d. The gross profit per 1000 cubic feet was 7·4d., compared with 7·6d. The amount required to pay interest and sinking fund in the ensuing year is 2·6d. per 1000 feet, compared with 5·1d. before; making the net profit 4·8d., against 2·5d.

HINCKLEY URBAN DISTRICT COUNCIL GAS SUPPLY.

Record Gas Profits.

At the last Meeting of the Hinckley Urban District Council, the report of the Gas Manager (Mr. Fred Lee), with the accounts of the Gas Department for the year ended the 31st of March, was presented. It showed that the receipts from the sale of gas were £11,636, and the total revenue was £15,389. The expenditure (including interest and sinking fund) being £11,861, the net balance was £3528, compared with £2977 before. The sale of gas produced £605 more than in the preceding year, though the price was reduced during the entire twelve months by 1d. per 1000 cubic feet, representing a loss of £344. The amount transferred to the general district fund was £650. The quantity of coal carbonized was 7967 tons, costing £5424, or 13s. 7·4d. per ton. The gas manufactured was 88,013,000 cubic feet, of which 85,245,900 cubic feet were sold; showing an increase of 6,762,900 cubic feet, or 8·61 per cent. The gas used on the works was 1,295,000 cubic feet; the unaccounted-for gas being 1,472,100 cubic feet, or 1·67 per cent. The Manager expressed his gratification at being able to present so favourable a report; the profit being, he said, the highest, and the prices charged for gas the lowest, in the history of the undertaking. In moving the adoption of the report, Mr. Kinton remarked that the Council had had the most successful year ever experienced in connection with the gas-works. There was an increase of more than £550 in the net profits, which constituted a record. When the last rate was levied, the first instalment of the grant from gas profits for rate relief was made; and at their last meeting the Committee passed the grant for twelve months. He thought everyone would agree that the report was a satisfactory one. Things were flourishing, and he hoped they would continue to do so. The report was adopted.

REDUCTION IN PRICE AT HAVERHILL.

In proposing the adoption of the Gas Committee's report at the monthly meeting of the Haverhill Urban District Council, Mr. J. B. Coster said that during the past year the business had gone along pretty much the same as usual. The demand for gas was increasing; and the point about the balance-sheet was that it represented the first year's working of the new plant. The outstanding feature in the receipts was that, though the price of gas was reduced by 2½d. per 1000 cubic feet, they had taken nearly as much as they did in the previous year—£2961, as compared with £3006. Thus the demand for gas had gone up though the price had gone down. The sales of residuals had amounted to £973, compared with £750 in the previous twelve months. So far as the expenditure side was concerned, they had been able to make considerably more gas with a smaller quantity of coal; but as the price for coal went up 9d. per ton, the figures for the past two years for the price of coal were somewhat alike. The profit for the year was £556. At the present time, the Council's outstanding loans totalled £3056, notwithstanding that £500 was borrowed last year on account of new works. When the Committee started—in 1906, he thought it was—to improve the works, the loans stood at £3450; so notwithstanding the fact that in the meantime over £3000 had been spent, the loans had been so reduced that they were now really in a better position than they were then. The Committee had decided to fix the price of gas at as low a rate as they possibly could. It had been the policy of the Committee and the Council that the question of preferential discounts should be dealt with whenever the price was fixed at whatever they might consider to be nearly the minimum; and they had taken this into consideration. The Committee had determined that the time had arrived when the preferential discounts should be abolished, and therefore proposed that this should be done, and that the price of gas be reduced to 2s. 11d. per 1000 cubic feet, with 2½ per cent. discount for cash in fourteen days; the slot-meters being adjusted accordingly. Also that the street lighting contract should be revised on the basis of 2s. 11d. per 1000 cubic feet consumed, *plus* maintenance. This reduction would take effect as from July 1. The present price was 3s. 6½d. per 1000 cubic feet, with allowances of 10 per cent. for fires and cookers, 12½ per cent. for gas-engines, 2½ per cent. for accounts over £10 per annum, 5 per cent. for accounts over £20 per annum, and 10 per cent. for accounts over £100 per annum, with 2½ per cent. for cash within fourteen days. At the present time, the large consumers were paying 3s. 2½d. per 1000 cubic feet. If they reduced the price of gas to 2s. 11d., and the large consumers took the 2½ per cent. discount for cash, the price would be practically reduced to 2s. 10d. per 1000 feet; so the reduction to large consumers was the difference between 3s. 2½d. and 2s. 10d. The report was adopted.

NEWPORT (SALOP) PUBLIC LIGHTING.

Gas Replaces Oil Lighting.

At a recent meeting of the Newport (Salop) Urban District Council, two tenders for the public lighting of the town—one from the Kitson Light Company (who at present have the lighting contract) and the other from the Gas Company—were under consideration. The matter was postponed to allow of the inspection of some improved lamps erected by the Gas Company by way of experiment. The subject came up again at the adjourned meeting of the Council last Tuesday. The Kitson Company had sent in a tender for £225; but they subsequently submitted an amended one for £204, or £5 less than it was last year, when there was no competing tender. The Gas Company's figure was £275, or 19 guineas less than that of the Kitson Company, *plus* the cost (£69 19s.) of the 22 gas-lamps as at present, on a five years' contract. Mr. C. W. Smallman (the Vice-Chairman of the Council), in moving the acceptance of the Gas Company's tender, said he thought the least they said about the amended offer of the Kitson Company, which was sent in after the tenders had been opened, the better. The Gas Company would give them 52 two-light and 38 one-light incandescent lamps, and also provide the lighting of the Boughey memorial lamp; and he submitted that by accepting their tender they would not only improve the lighting of the town, but—and this was no small matter—would also support a local industry which employed local labour. He was not going to say one word against the Kitson light. If they wanted Kitson lamps, and obtained a sufficient number of them, they would have a most brilliantly-lighted town; but they could not afford this sufficiency. The lamps exhibited by the Gas Company had been well spoken of by the ratepayers who had seen them, and who had expressed their opinion that it would be well if they were utilized throughout the town. No one would say that the town was well lighted at the present time. If they effected the change he proposed, they would be able to light the district very much better than it had ever been lighted in the past. If the Gas Company's tender was accepted, he had no doubt that, by making gas on a larger scale than at present, and providing additional machinery for producing it, the consumers would eventually benefit. It might be asked why they should make the contract for five years. He thought this was justifiable, as the Company were going to a large expense. They were going to provide new lanterns of approved type, which would make Newport the best-lighted town in Shropshire—nay in the West Midlands. The motion was carried with three dissentients.

Ealing Public Lighting.—The Ealing Town Council have decided to enter into a five-years contract with the Brentford Gas Company for the lighting, cleaning, and maintenance (except painting and glazing) of the Council's 890 gas-lamps, which are in future to be supplied with 3·5 instead of 3·3 cubic feet burners, at £2 9s. 6d. per lamp per annum. It was stated that this would mean an additional cost to the Council of £25 5s. per annum; but there would be a considerable gain in lighting and efficiency. The Company are to take over six of the youngest of the Council's staff of fourteen lamplighters.

THE LABOUR QUESTION IN MILAN.

In the two preceding issues of the "JOURNAL," reference has been made to this subject, in regard to which some authoritative information was given last week (p. 921). We have since received the following particulars, translated from a statement showing the reasons for the strike taking place.

The gas workers of Milan again went on strike on the 13th of June. Let us hasten to add that the Compagnie l'Union des Gaz at once took the necessary steps to replace all the strikers, and to assure the service of gas to the city of Milan under quite normal conditions, so that the Milanese, if they did not read the newspapers, would hardly know there was a strike of gas workers at all.

What is the motive of the strike? It is as follows: A year-and-a-half ago, the gas workers, after a 25 days' strike, had to accept and sign individually a new contract, which contract had been previously discussed between the Company, the Prefect and Mayor of the city, and a commission of workmen, and consequently bore the signatures of the interested parties as well as those of the town authorities. In this new contract, the Company had adhered to all the economic advantages of the preceding contract, but had changed all the disciplinary part, and had further imposed compulsory arbitration in case of disagreement on any matter whatever. There was reason to believe, therefore, that the era of strikes was definitely ended; the workmen being obliged to have recourse no longer to extreme measures, but to apply to the arbitrators in case of dispute.

This compact was maintained, somehow or other, for a year-and-a-half. But at the commencement of this year the workmen syndicated themselves more closely than ever; and in April they commenced a violent agitation to get back the old working contract, on the pretext that, notwithstanding the signatures given, they had never accepted the present contract. In order to put an end to this disloyal agitation, the Company then offered their staff improvements in the way of extending the existing scales of pay beyond the maximum already fixed. For example: Workmen who with the present contract automatically arrived at the maximum of pay in ten years, would, on the contrary, reach this in fifteen years; further increases being granted after the eleventh year. In this way, four-fifths of the staff had an immediate advantage of 10 frs. per month.

Having, consequently, to modify all the scales of pay, the Company made a new edition of the working contract in force, asking their workmen to sign again this contract, which was absolutely identical with the preceding one which the staff had signed individually a year-and-a-half before. At this moment, the leaders interfered; stating that the staff could not accept this improved contract because they had never accepted the original one, and that, as far as they were concerned, there was only one contract which counted—the one in force before the last strike. The Company therefore replied that they would keep to themselves the advantages offered, and would continue to adhere to the contract in force—the one signed by the men in 1909 after the last strike, and countersigned by the town authorities.

While all this was going on, the Company had on Saturday, the 10th of June, to discharge 90 labourers who were superfluous owing to the

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 986.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Apl. 12	5	Alliance & Dublin Ord.	83—86	..	5 16 3
374,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
200,000	5	May 12	7	Bombay, Ltd.	6¼—6¾	..	5 3 8
40,000	5	,,	7	Do. New, £4 paid	5½—5¾	..	4 17 5
50,000	10	Feb. 24	15	Bourne-mouth Gas & Water Pref. 6 p.c.	28½—29½	..	5 1 8
311,810	10	,,	7		16¾—16¾	..	4 3 0
75,000	10	,,	6		14½—15	..	4 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	257—262	..	4 15 5
330,000	,,	,,	9½	Do. New	203—208	..	4 11 4
50,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	..	4 0 8
206,250	,,	June 15	4	Do. 4 p.c. Deb.	97—99*	..	4 0 10
220,000	Stk.	Mar. 10	11	Brighton & Hove Orig.	217—220	..	5 0 0
246,320	,,	,,	8	Do. A Ord. Stk.	157—160	..	5 0 0
490,000	20	Apl. 12	11¾	British	43¾—44½	..	5 5 7
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	96—98	..	4 1 8
109,000	,,	Feb. 10	6	Bromley, A 5 p.c.	116—118	..	5 1 8
165,700	,,	,,	4½	Do. B 3½ p.c.	87—89	..	5 1 2
82,278	,,	,,	5½	Do. C 5 p.c.	106—108	..	5 1 10
55,000	,,	Dec. 30	3½	Do. 3½ p.c. Deb.	84—86	..	4 1 5
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	97—99	..	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	3—4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6—6½	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	—	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	88—90	..	5 0 0
157,150	Stk.	Feb. 24	5	Chester 5 p.c. Ord.	109—111	..	4 10 1
1,513,280	Stk.	,,	5/9/4	Commercial 4 p.c. Stk.	114—116	..	4 14 3
560,000	,,	,,	5½	Do. 3½ p.c. do.	108—110	..	4 16 11
475,000	,,	June 15	3	Do. 3 p.c. Deb. Stk.	75½—77½*	..	3 17 5
800,000	Stk.	May 31	4	Continental Union, Ltd.	92—95	..	4 4 3
200,000	,,	,,	7	Do. 7 p.c. Pref.	134—136	..	5 2 11
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2
148,995	,,	Apl. 12	5	East Hull 5 p.c. Ord.	—	..	—
840,150	10	Jan. 27	10	European, Ltd.	19—20	..	5 0 0
16,179,445	Stk.	Feb. 24	4⅜	Gas-light and Coke	4 p.c. Ord.	106—107	..	4 7 2
2,600,000	,,	,,	3½		3½ p.c. max.	85—87	..	4 0 6
4,062,235	,,	,,	4		4 p.c. Con. Pref.	103—105	..	3 16 2
4,531,705	,,	June 15	3		3 p.c. Con. Deb.	78½—80½*	..	3 14 6
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.		95—97	..	5 3 1
82,500	,,	,,	6½	Do. do. 5 p.c.		—	..	—
70,000	10	Apl. 27	11	Hongkong & China, Ltd.		17½—17⅝	..	6 3 11
131,000	Stk.	Mar. 10	7⅜	Ilford A and C		147—150	..	4 18 4
65,780	,,	,,	5⅝	Do. B		117—120	..	4 17 11
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.		96—98	..	4 1 8

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	May 12	9	Imperial Continental	185—187	−1	4 16 3
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	92—94	..	3 14 6
200,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.	119—121	..	4 19 2
561,000	Stk.	Feb. 24	10	Liverpool United A.	214—216	..	4 12 7
718,100	,,	,,	7	Do. B.	163—165	..	4 4 10
306,083	,,	Dec. 30	4	Do. Deb. Stk.	104—106	+1½	3 15 6
75,000	5	June 15	6	Malta & Mediterranean	4⅜—4¾*	..	6 3 1
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	May 31	3½	Monte Video, Ltd.	13⅜—13¾	..	5 5 8
1,775,892	Stk.	Feb. 24	4⅜	Newc'tle&G'tesh'd Con.	102½—103½	..	4 4 6
520,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	89—90	..	3 17 9
55,940	10	Mar. 10	7	North Middlesex 7 p.c.	15—16	..	4 7 6
300,000	Stk.	Apl. 27	8	Oriental, Ltd.	137—139	..	5 15 1
60,000	5	Apl. 12	8	Ottoman, Ltd.	6⅞—7⅛	..	5 10 4
31,800	53	Feb. 24	13	Portsea Island A	135—140	..	4 18 4
60,000	50	,,	13	Do. B	—	..	—
100,000	50	,,	12	Do. C	120—125	..	4 16 0
114,800	50	,,	10	Do. D and E.	—	..	—
398,490	5	May 31	8	Primitiva Ord.	7⅜—7⅝	..	5 3 3
796,980	5	Dec. 30	5	Do. 5 p.c. Pref.	5¼—5½	..	4 8 11
488,900	100	June 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
312,650	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	97—99	..	4 0 10
250,000	10	Mar. 24	9	San Paulo, Ltd.	19½—20½	−½	4 7 10
115,000	10	,,	6	Do. 6 p.c. Pref.	12—12½	..	4 16 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Mar. 24	10	Sheffield A	235—237	..	4 4 5
209,984	,,	,,	10	Do. B	235—237	..	4 4 5
523,500	,,	,,	10	Do. C	234—236	..	4 4 9
70,000	10	June 15	7	South African	8½—9¼*	..	7 7 4
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	119—121	..	4 10 3
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	80—82	..	3 13 2
209,820	Stk.	Mar. 10	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Feb. 24	5⅜	S'th Suburb'n Ord. 5 p.c.	119—121	..	4 13 6
60,000	,,	,,	5	Do. 5 p.c. Pref.	118—120	..	4 3 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	123—125	..	4 0 0
502,310	Stk.	May 12	5	Southampton Ord.	109—111	..	4 6 11
120,000	Stk.	Feb. 10	7	Tottenham A 5 p.c. and B 3½ p.c.	147—150	..	4 13 4
483,940	,,	,,	5½		116½—118½	..	4 12 10
149,470	,,	June 15	4	Edmonton 4 p.c. Deb.	96—98*	..	4 1 8
182,380	10	June 15	8	Tuscan, Ltd.	8⅜—9¼*	..	8 13 0
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
236,476	Stk.	Feb. 24	5	Tynemouth, 5 p.c. max.	115—117	..	4 5 6
255,636	Stk.	Feb. 24	6¾	Wands-worth B 3½ p.c.	141—143	..	4 14 5
85,766	,,	Dec. 30	3	3 p.c. Deb. Stk.	73—75	..	4 0 0

Prices marked * are "Ex. div."

reduction in the make of gas and the introduction of a mechanical coke-transporting installation which displaced 150 labourers. The men made a pretext of these dismissals to go on strike, whereas, according to the contract in force, they ought first of all to have applied to the arbitrators.

It must be noted, in passing, that the Syndical Chamber of Milan gave a verdict against the gas workers in this instance; advising them not to strike, but to keep to their contract—that is to say, to apply for arbitration. In short, the essential point of the question is this: The staff of workmen for ten years had got into habits of extravagant lack of discipline. With the present working contract, discipline has been re-established little by little; the staff have had to adapt themselves to their real position of subordinates, which they had abandoned for many years. The present agitation, made on a pretext which has not a leg to stand on—dismissals owing to slackness of work—is but for the purpose of destroying the present contract, to substitute it by another re-establishing the sovereign power of the workmen's commissions.

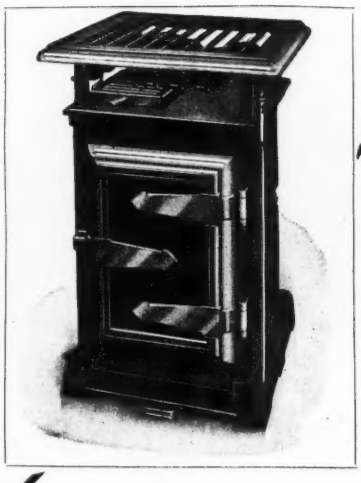
We may add to the foregoing statement that, as intimated last week, the supply of gas has been well maintained, and there is every indication that the strike will gradually cease, as some of the men are now applying to be taken back into their original positions.

METROPOLITAN WATER BOARD.

The Budget for 1911-12—An Estimated Deficiency.

At the last Meeting of the Metropolitan Water Board, the estimates for the year 1911-12 were submitted.

Mr. A. H. Tozer, the Chairman of the Finance Committee, in dealing with the accounts, said that last year he mentioned that, so far as could be then ascertained, the deficiency for the year 1909-10 would probably be about £61,000, compared with the estimated deficiency of £75,000. The actual deficiency for the year, however, proved to be only £46,000. The year 1910-11 would probably result in a deficiency of some £56,000, compared with the estimated deficiency for that year of £85,000. On the other hand, the expenditure, instead of being as estimated—viz., £2,982,000—was only approximately £2,957,000; showing a reduction of £25,000. Turning to the estimates for the current year, he said the income (in which the principal item was water-rental) was estimated to be £2,794,500, against £2,791,585 for the previous year; the increase amounting to only £2915. The smallness of this increase was extremely disappointing, especially in a year immediately following a quinquennial valuation of the Metropolis. The result of the valuation was a decrease instead of an increase in the rateable value; and the effect on the Board's water-rental was estimated to be a loss of about £8000. Another disturbing element which adversely affected the Board's water-rental for the current year was the reduction in the rateable value of licensed premises. So far as could at the moment be ascertained, these reductions had diminished the Board's income by some £17,000 per annum. The local rates in the London boroughs averaged about 7s. 6d. in the pound; whereas the water-rate was only 1s. in the pound, with a comparatively slight addition for non-domestic purposes. The total income, apart from accommodation works, was estimated at £2,816,820. That from accommodation works was estimated at £86,000; and the expenditure on prime cost £75,000. The total estimated expenditure, apart from accommodation works, was £2,913,570; showing an increase of £33,000 over the approximate expenditure of last year, practically the whole of which was accounted for by the increase in debt charges and rates and taxes. Out of the total expenditure, no less than £1,597,550 was represented by debt charges and £424,650 by rates and taxes; so that these two items alone accounted for £2,022,200, or upwards of two-thirds of the total expenditure of the Board. It was found that the expenditure per head of the population not only showed no increase, but an actual decrease, in the two years. It was clear, therefore, that the Board were now reaping the benefit of economies in administration which had been effected both in the Works and Stores Committee and in the other executive committees. The actual capital outlay on the extension of the undertaking since the appointed day (June 24, 1904) amounted to £2,626,688, of which about £700,000 was in respect of the completion of works commenced by the Water Companies. Practically the whole of these works were completed; and the increases in capital expenditure now being made from time to time originated with the Board. To sum up the figures shown in the estimates presented, they were providing for a total expenditure for all purposes of £2,988,570; while the income anticipated was only £2,902,820—leaving an estimated deficiency of £85,750. This was an estimate only; and one could but hope that, as in former years, the actual result of the year's working would show an improvement on this figure. The actual realized deficiencies amounted to £127,356. If they added to this the estimated deficiency for the current year, it would be seen that when the present year was completed the total deficiency would have aggregated to rather more than £200,000. The total funded debt of the Board stood at £48,717,332 at March 31, compared with £48,788,524 at March 31, 1910; the decrease of £71,192 being accounted for by further cancellations of stock. In addition, the Board would remember that the unfunded debt amounted to £984,483; being the product of the £1,000,000 of money bills issued in February last. His task would have been a much more pleasing one if it had been possible for him to show a surplus instead of a deficiency; and he was sure this feeling would be shared by all the members. He considered the position of the Board was like that of a commercial firm over-capitalized; they were trying to pay dividends out of income which was not sufficient to meet their requirements because of the Act of Parliament. But they were not responsible for the action of the House of Commons. In his judgment, it would be some years before they could hope for an improvement.



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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

On Tuesday, Mr. A. C. Young, the Gas Engineer and Manager to the Corporation of Arbroath, presented his annual report to the Gas Committee. The quantity of gas made during the year was reported to have been 103,516,900 cubic feet—an increase upon the previous year of 5,003,500 cubic feet. Mr. Young estimated that at May 15, 1912, the profit available for placing against the suspense account would be £2686. From this sum, however, there will fall to be deducted £150 for works required, and £110 for rebates to large consumers. The balance would then be £2426, which would be £518 more than would be needed to clear off entirely the debt still left standing in the suspense account. If the price of gas were reduced all round by 2½d. per 1000 cubic feet, the revenue would be reduced by £995; and about £450 would still be standing against the suspense account at May 15, 1912. But, Mr. Young pointed out, in May, 1902, the capital account was equal to 18s. 2d. per 1000 cubic feet of gas accounted for; while on May 15, 1911, it was only 11s. 6d., notwithstanding that there had been added £5000 worth of cookers, £3000 worth of coin-meters, and all the new plant put in since 1902. Undoubtedly great progress had been made during the past nine years in the reduction of the capital debt, in comparison with the actual value of the gas undertaking; and he was of opinion that a reduction of 2½d. per 1000 cubic feet of gas should now be made. The Gas Committee, after considering Mr. Young's report and recommendation, resolved to recommend to the Town Council that the price of gas should be reduced all round, which would make it 2s. 6d. per 1000 cubic feet to ordinary consumers, 2s. 11d. to prepayment meter consumers, and for power purposes from 2s. 1d. to 2s. 3½d., with discounts for large quantities. The reduction and the discounts amount to about £1105.

We have been almost forgetting that there was a gas transfer in progress at Fraserburgh; but it is brought back to mind by the announcement that the Oversman has given his award. This is, in round figures, £27,000, with £650 for stocks; and the Company are entitled to retain the profit they earned during the year ending April 30 last, amounting to about £2000. The announcement which I have seen concludes with the statement that it is likely that for a year or two the price of gas in Fraserburgh will have to be increased to meet this high expenditure. This remark is entirely unwarranted. The capital of the Company is £13,500; and the price of gas is 4s. 2d. per 1000 cubic feet. The output is 23 million cubic feet a year. In the Kirkcaldy transfer, which was judicially decided quite recently, the capital was £65,000, and the award was £137,000. In both cases the sum awarded is slightly more than double the capital.

In the report for the past year by Mr. J. Bell, the Manager of the Kirkintilloch Corporation gas undertaking, it is stated that the quantity of gas made amounted to 67,850,000 cubic feet—2,070,000 cubic feet more than in the previous year. The coal carbonized was 7503 tons, and the yield of gas 9043 cubic feet per ton, or 119 cubic feet per ton more than in the previous year. The value of residual products sold was £3828, which was £396 more. In spite of the fact that £30,000 was borrowed to meet the cost of the new gas-works, the Gas Committee have since been able to reduce the price of gas, and to leave a satisfactory balance in hand. The Corporation have just concluded negotiations with the Woodilee Coal and Coke Company for the retention of the coal under the new gas-works.

In Port-Glasgow, it is reported, there is a net surplus upon the past year's working of the gas undertaking of £1034.

The recently-formed Gas Company at Fauldhouse have resolved to reduce the price of gas from 5s. to 4s. 7d. per 1000 cubic feet; and have paid a dividend for the year at the rate of 6 per cent.

At the annual meeting of the Muirkirk Gaslight Company, Limited, this week, it was reported that the quantity of gas measured at consumers' meters during the year was 4,058,400 cubic feet. There had been lost by leakage and condensation 14 per cent. of the gas made. The coal carbonized amounted to 534 tons; and the average price was 12s. 10½d. per ton. The profit for the year was £195. A dividend of 7½ per cent. was declared.

At Moffat, where a system of automatically lighting and extinguishing the public lamps has been in use for some time, the cost of gas consumed during the past lighting season, it is reported, amounted to £61, as compared with £125 in the year preceding.

On the evening of Sunday last, a very distressing case of poisoning by gas was discovered at No. 28, Baldovan Terrace, Dundee. The house was occupied by Alex. Rae, a tramway car conductor, and his wife. Mrs. Rae left on Saturday morning to take an invalid sister of her husband's for a week-end holiday. Rae was on duty till nearly midnight. He appeared, on returning home, to have cooked his supper upon a gas-stove in a pantry off the kitchen, and to have then gone to bed. He should have gone on duty on Sunday morning, but did not do so. Late at night some of his colleagues called at his house to ascertain the cause of his absence. He was found lying in bed, dead. The gaslight in the kitchen, where the bed was, was properly turned off. The pantry door was closed; but the tap of the gas-stove within it was partly open. It had either not been properly turned off or had been accidentally turned on again. The gas had had to find its way below the closed door of the pantry before it reached the kitchen.

For the settlement of a difference which had arisen between the Edinburgh and District Water Trust and the Town Council of Dalkeith, with reference to the charge to be made by the Trust for water supplied to the burgh of Dalkeith, application has been made to the Sheriff of Midlothian, as Arbiter under the Edinburgh Water Act of 1876. In accordance with that Act, the Trust have given the burgh a supply not exceeding 100,000 gallons daily, at a charge of 3d. per 1000 gallons. In February, 1910, however, they intimated to the Town Council that the charge would thereafter be at the rate of 6d. per 1000 gallons. The Trustees, it was stated, had found it necessary to incur expenditure to the amount of £1,276,410 in introducing an additional supply of water;

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and they had had, as a result, to increase the assessments within the compulsory area. They considered, therefore, that it was reasonable that outside consumers should pay an additional rate, seeing that they incurred no liability in respect of the capital cost or maintenance of the undertaking. A rate of 3d. per 1000 gallons was much below the cost price. On behalf of the burgh of Dalkeith, it was replied that the price was fixed by agreement, and could not be altered; and that under the Statute they could not be held to be on the same footing as communities outside the compulsory area which were supplied. The water in dispute was the water of the South Esk. The town of Dalkeith is built upon the north bank of the South Esk; and it was claimed that it was therefore entitled to prior consideration in the disposal of the water taken. As a matter of fact, in 1871 the burghs of Dalkeith and Musselburgh obtained powers to take this water; but their powers expired in 1876 without works having been constructed. The Edinburgh Act of that year, it was contended, gave powers to Edinburgh, upon condition of granting facilities to Dalkeith. Sheriff Maconochie heard evidence in the matter a month ago; and he has now issued his decision, in which he finds that the Water Trustees are entitled to increase their charge. He fixes the amount of the charge at 5d. per 1000 gallons.

CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 1026.]

LIVERPOOL, *June* 23.

Sulphate of Ammonia.

The latter half of the week has been practically given over to the Coronation festivities; but for the first three days there was a very active market, and all available supplies were readily taken up at advancing prices. Demand from consumers abroad has only been on a moderate scale, but some of the dealers have shown themselves to be anxious buyers of prompt goods. The closing quotations are £13 1s. 3d. to £13 2s. 6d. per ton f.o.b. Hull, £13 2s. 6d. to £13 3s. 9d. per ton f.o.b. Liverpool, and £13 3s. 9d. to £13 5s. per ton f.o.b. Leith. In the forward position, manufacturers have now assumed a very firm attitude, and are asking £13 10s. per ton f.o.b. best ports, which figure purchasers have so far refused to pay. It is reported, however, that business has been done for October-March delivery at £13 7s. 6d. per ton.

Nitrate of Soda.

The market for this article is steady at 9s. 10½d. per cwt. for ordinary and 10s. 1½d. for refined quality, on spot.

LONDON, *June* 26.

Tar Products.

The markets for tar products have remained very firm during the past week. In pitch, there has been a fair amount of inquiry for forward delivery, which has kept prices extremely steady. Benzols continue in about the same position. Solvent naphtha is quiet; but reasonable prices are now being quoted. Heavy naphthas are in good demand. Creosote is steady; and there has been a fair amount of business in this article recently.

The average values during the week were: Tar, 18s. to 22s., *ex* works. Pitch, London, 36s. 6d. to 37s.; east coast, 36s. to 36s. 6d.; west coast, Manchester, 35s. 6d. to 36s., Liverpool, 36s. to 36s. 6d., Clyde, 36s. to 36s. 3d. Benzol, 90 per cent., casks included, London, 9d. to 9⅛d.; North, 9d.; 50-90 per cent., casks included, London, 8⅞d. to 9⅛d.; North, 8½d. to 9d. Toluol, casks included, London, 9⅜d. to 10d.; North, 9⅛d. to 9¼d. Crude naphtha, in bulk, London, 4d. to 4½d.; North, 3⅞d. to 3⅞d.; solvent naphtha, casks included, London, 11d. to 11⅜d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11½d. to 1s. 0½d.; North, 10d. to 10½d. Creosote, in bulk, London, 2½d. to 2⅝d.; North, 1⅝d. to 2d. Heavy oils, in bulk, 2⅝d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 9d. to 1s. 9½d.; west coast, 1s. 8d. to 1s. 9d. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 42s. 6d., bags included. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

There has been much more inquiry for this article, especially for forward delivery. To-day, actual Beckton is quoted £12 16s. 3d.; outside London makes, £12 7s. 6d.; Hull, £13 1s. 3d.; Liverpool, £13 1s. 3d.; Leith, £13 5s.; and Middlesbrough, £13. For forward delivery, 2s. 6d. to 5s. per ton extra is asked.

We have received from Messrs. Oakes, Belk, and Skinner, of Sheffield, a booklet showing the capital, last balance-sheets, five years' profits and dividends, &c., of northern coal, iron, and steel companies. It is published by the Business Statistics Publishing Company, Limited, of Sheffield and Cardiff, at the price of 1s. net.

Mr. A. Stanford held a Local Government Board inquiry at Pontnewydd last Tuesday, into an application by the Llanfrechfa Upper Urban District Council for sanction to borrow £2200, less £900 for which sanction had already been received, for carrying out improvements to the water-works. The Clerk (Mr. W. Clark) said the works for which they desired the loan were now nearly completed. In April last year, sanction was received to spend £4885 for water-works; and the present application arose in consequence of the withdrawal of the two lowest tenders.

At the Royal Sanitary Institute, Buckingham Palace Road, the question of lighting and ventilating has, it is said, been successfully solved by Mr. W. Edgar, of Hammersmith. One of the old types of "Sun" burners formerly in use has been replaced by an eight-light inverted ventilating lamp constructed of polished brass and copper with enamelled reflector, and giving an illuminating power of more than 1400 candles. The general effect is, it is claimed, "exceedingly artistic" and "an enormous saving in gas consumption has been effected"—40 cubic feet per hour being used with the new fitting, against 300 cubic feet with the old one. The ventilation is effected by a series of tubes carried to the outside of the building. In every part, except under the galleries, one can read with comfort.

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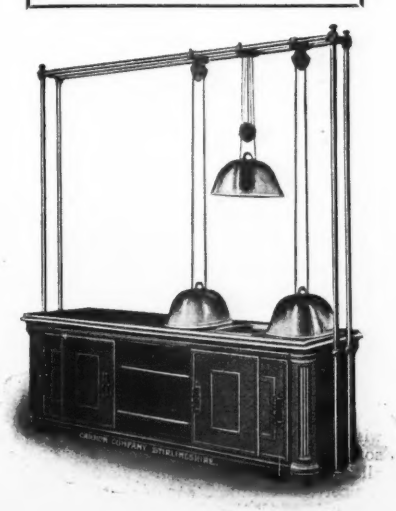

COAL TRADE REPORTS.

Northern Coal Trade.

The Coronation festivities caused interruption to the production of coal; so that there has been a limited output, and irregular business. Quotations vary a good deal. Best Northumbrian steam coals are about 10s. 7d. to 10s. 9d. per ton f.o.b.; second-class steams from 9s. 3d. to 9s. 6d.; and steam smalls from 5s. to 6s. 3d.—though for prompt shipment rather better prices are in some cases asked. The production, however, should now soon return to that which is normal. In the gas coal trade, early supplies are not so plentiful; and the prices are very firm. Durham gas coals are about 9s. 6d. per ton f.o.b. for second class; 10s. 1½d. to 10s. 4d. for best sorts; and about 10s. 9d. to 10s. 10½d. for "Wear" specials. There is, too, a very steady tone in the forward market for gas coals; and there are inquiries for some 3000 tons of medium gas coals per month, for a year from the autumn, for one of the Belgian ports. Labour difficulties at the ports seem to be stiffening the prices of coal. In coke, there is not much alteration. Gas coke is in slow supply, and is quoted at about 14s. to 14s. 3d. per ton f.o.b. in the Tyne for good makes.

Scotch Coal Trade.

Trade remains in the same depressed condition, and its prospects are rendered much worse by the seamen's strike which is in progress. Prices accordingly still continue to droop for all classes. These are quoted as: Ell, 8s. 3d. to 9s. 6d. per ton f.o.b. Glasgow; splint, 9s. to 9s. 3d.; and steam, 8s. 9d. to 9s. The shipments for the week amounted to 349,138 tons—an increase of 52,996 tons upon the previous week, and of 54,963 tons upon the corresponding week last year. For the year to date, the total shipments have been 5,931,790 tons—being a decrease of 16,770 tons upon the corresponding period.

Thames Conservancy and the Metropolitan Water Board.—Lord Desborough presided on Monday last week at a meeting of the Thames Conservancy Board, and referred to the arrangement which the Board had entered into with the Metropolitan Water Board in regard to the Bill to amend and consolidate the enactments relating to the abstraction of water from the Thames by the Board. The Bill further provides for increased payments to be made by the Board to the Conservators. His Lordship said he thought they had come to an agreement that would be satisfactory to all parties. A vote of thanks to him for his services in the intricate and prolonged negotiations was carried by acclamation.

Fareham Water Supply.—An inquiry held recently on behalf of the Local Government Board at Fareham, led the Inspector (Mr. Courtenay T. Clifton, M.Inst.C.E., to remark upon the inadequate water storage; the reservoir holding only 120,000 gallons for a population of 9000. The present daily demand of the residents was stated to be about 250,000 gallons; and the estimated increase by new buildings was 32,000 gallons per diem. It was mentioned, however, that the pumps were kept going only from 12 to 15 hours; and that the Urban District Council had authority to tap the Gosport Water Company's mains, which pass through the parish. There was no opposition to the proposal of the Council to borrow £650 for laying mains.

An Ox Roasted by Gas at Bedford.—In connection with the Coronation festivities at Bedford, an ox was successfully roasted by gas in a specially built fire-brick oven. The Engineer (Mr. Thomas Dann) and other officials of the Gas Company took charge of the erection of the chamber and the making of the oven-burners; and a number of tests were made by them to ascertain the temperature of the oven. At first the heat was too well contained, and the temperature far higher than was required; but after increasing the number of the ventilation holes and checking the gas-flame, a uniform heat of about 300° Fahr. was obtained. After about nine hours, the ox was declared to be perfectly cooked. We believe this is the first time such a thing has been done in a gas-oven.

Aspley and Woburn Sands Water Supply.—About two years ago, a scheme for procuring water for the supply of Aspley Guise and Aspley Heath, in the area of the Ampthill Rural District Council, and for Woburn Sands, in that of the Newport Pagnell Rural District Council, was prepared, and was approved by the Local Government Board. The work, for which a contract was let in 1909, consisted of sinking a permanent well 9 feet in diameter, erecting an engine-house, and installing duplicate gas-engines and pumps; each set being capable of raising 15,000 gallons an hour through 2½ miles of 9-inch main to the service reservoir at Bow Brickhill. This contains 390,000 gallons, and is at such an altitude that practically the whole of the district can be supplied by gravitation. The water is distributed over the district by about ten miles of 8, 6, 4, and 3 inch cast-iron pipes, with the necessary stop, scour, and air valves, together with fire-hydrants.

"Paper-Bag" Cookery by Gas.—A good deal has lately been heard of M. Soyer's system of paper-bag cookery, one of the advantages claimed for which is that it saves gas. One enthusiastic *chef* goes so far as to assert that by the use of these envelopes 40 per cent. less gas is needed to cook a given article than when it is not so enclosed. A writer in the "Ironmonger," however, says that in experiments made in his own household and by several of his neighbours, this economy of fuel does not seem to be attainable. He adds: "Possibly where cooking is being carried on continuously, as in restaurants and hotels, the temperature of the oven, when once raised to the proper degree, can be kept at that level with the burners turned partly down; but for the intermittent cooking of a small family, as much gas appears to be consumed with this new paper-bag cookery as with the ordinary method. This seems to show that gas-cookers with ovens much smaller than those ordinarily supplied, or cookers with ovens easily divisible into compartments, would better meet the requirements of the small household, if it is wished to popularize cookery *en papillote* by gas. Here is a chance for some enterprising firm to design a gas-cooker sufficiently adaptable to allow either a 10 lb joint or a dish of eggs and bacon to be cooked to a nicety, and without any of that waste of heat which at present seems unavoidable."

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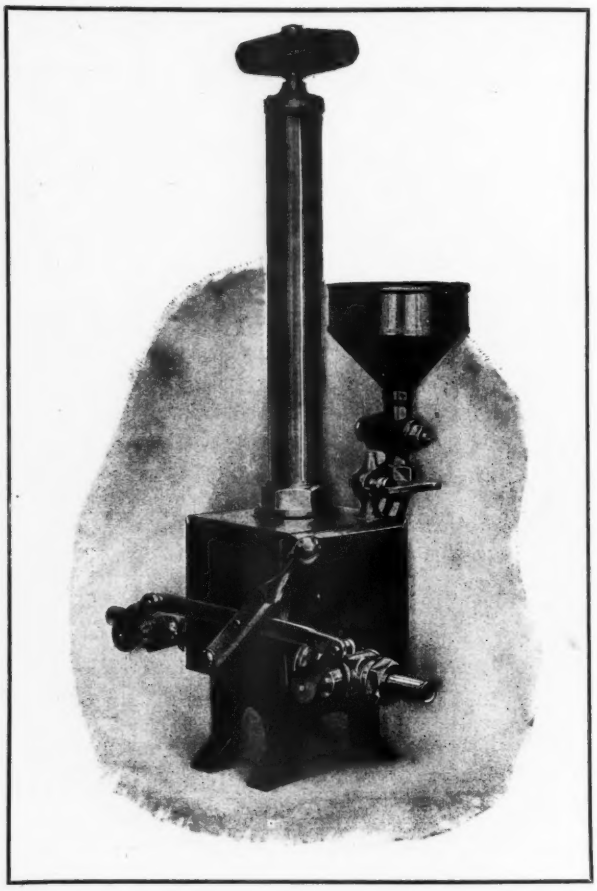

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East Surrey Water Company.—The Directors report that the profit for the year ended the 25th of March was £29,217, which with the balance of £4134 brought forward is increased to £33,351. Out of this the Directors have placed £2000 to the renewal and contingency fund; and they recommend that dividends of 5 per cent. upon the preference shares, 7 per cent. upon the ordinary "B" shares, and 10 per cent. on the original ordinary "A" shares (less income-tax in all cases) be declared for the year. An interim dividend of 2½ per cent. upon the preference and 3½ and 5 per cent. upon the ordinary shares respectively, disposing of £9340, having been paid on Dec. 1 last, there remained 2½ per cent. to be paid upon the preference shares and 3½ per cent. and 5 per cent. respectively upon the ordinary "A" and "B" shares, absorbing £9571, and leaving a balance of £6122 to be carried forward.

Fire on the Premises of the York Gas Company.—Early last Wednesday morning, a fire broke out on the premises of the York United Gaslight Company, which have a frontage in Davygate. The offices occupy the front portion of the building; while the rear part, which is of more recent construction, contains the workshops. It was here that the fire originated; the cracking of glass arousing the caretaker, who lives opposite the premises. He saw that the top storey was in flames, and immediately sent for the fire brigade, which was quickly on the spot. The fire had got a good hold, however; and within half-an-hour of the discovery of the outbreak, part of the roof fell in. Eventually the firemen got an escape in position, and, playing directly on the flames, soon had the fire quite under control. The top storey of the building was gutted. By 7 o'clock, the fire was out; and the employees were all of them at work as usual on the ground floor of the shops in the morning. The origin of the fire was stated to be unknown.

APPLICATIONS FOR LETTERS PATENT.

12,841.—Levy, L. A., "Automatically recording the percentage of carbon monoxide in gaseous mixtures. May 29.

12,857.—Ely, B., and Masters, R., "Evaporating and bye-product recovery plant." May 29.

12,909.—Agudio, R. E., "Safety device against leakage in gas-installations." May 29.

12,910.—Agudio, R. E., "Detector for gas leakage." May 29.

12,944.—Schäffer and Budenberg, Ltd., "Pressure-gauges." A communication from Schäffer and Budenberg G. m. b. H. May 30.

13,035.—Woodroffe, C., "Light-increasing globe." May 31.

13,055.—Livesey, R. M., "Acetylene-generators." May 31.

13,083.—Goodson, J. H., "Gas-governors." May 31.

13,093.—Kerpely, A. von, "Gasification of fine-grained or pulverulent fuel." May 31.

13,106.—Chrisman, H., "Measuring or indicating the flow of fluid through a conduit." May 31.

13,107.—Chrisman, H., "Water-supply systems." May 31.

13,125.—Clarke, H., and Campbell, J. A., Destructive distillation of coal." May 31.

13,147.—Baldock, F. R., and Clark, E. F., "Steam-water gas valves, cocks, and the like." June 1.

13,164.—Liversedge, A. J., and Davidson, W. B., "Apparatus for washing gases, applicable also for distilling and such-like purposes." June 1.

13,169.—Bruno, W., "Mantles." June 1.

13,172.—Marks, E. C. R., "Automatic bye-pass valves." A communication from the American Rotary Valve Company. June 1.

13,192.—Moore, W. H., and Shardlow, A., and Co., Ltd., "Charging-hoppers for gas-producers." June 1.

13,193.—Moore, W. H., and Shardlow, A., and Co., Ltd., "Sprinklers for scrubbers." June 1.

13,207.—Farquhar, C. W., "System of lighting." June 1.

13,217.—Gardner, R. C., "Turning on and off gas from a distance by gas pressure." A communication from J. Rostin. June 1.

13,241.—Vestergaard, O. J., "Mounting gas-meters." June 1.

13,319.—Leech, W. J. B., "Vertical retort-settings." June 2.

13,322.—Gumprecht, F. G., and Noad, A. C., "Incandescent burners." June 2.

13,336.—Clarke, H., and Campbell, J. A., "Discharge of tar and liquor from hydraulic mains." June 2.

13,345.—Stephens, W. C., "Cocks or valves." June 2.

13,347.—Roxburgh, A. B., and Scott, J. E., "Gas-fired water-heater with thermostatic control." June 3.

13,383.—Société H. Gouthière et Cie. and Ducancel, P., "Recovery of sulphur from the refining materials employed in the manufacture of gas." June 3.

13,399.—Hendler, O., "Welding and cutting burners." June 3.

13,411.—Kamp, W. A. J. van de, "Safety device for gas-lamps." June 3.

13,424.—Keeble, A. J. & H., "Gas manufacture." June 3.

13,440.—Burnett, J., "Liquid meters." June 6.

13,501.—Yates, H. J., "Gas-fires and other heating appliances." June 6.

13,518.—M'Donald, D., "Coke-quenching apparatus." June 6.

13,646.—Wilcox, W. L., "Rotary meters." June 7.

13,691-2.—Binz, G. A. H., "Automatic analysis of gases." A communication from the Allgemeine Feuertechnische G. m. b. H. June 8.

13,757.—Sutcliffe, J. T., "Support for incandescent mantles." June 9.

13,777.—Liversedge, A. J., "Separation of water from tar." June 9.

13,783.—Keep, C. C., "Jointing of pipes." June 9.

13,814.—Still, W. M., and Sons, Ltd., and Still, E. A., "High-pressure lighting." June 9.

13,852.—Sawyer, H. C., "Burner-pricker." A communication from H. G. Stephens. June 10.

13,865.—Keith, J. & G., "Gas-lamps." June 10.

13,892.—La Société Courtaud G. Garnier Gil et Cie., "Operating cocks from a distance." June 10.

PARKINSON'S HYDROTHERM

FITTED IN BASEMENT OR ATTIC WILL SUPPLY HOT WATER TO EVERY ROOM.

AUTOMATIC IN ACTION.

Gas Controlled by the Operation of any Hot Water Tap.

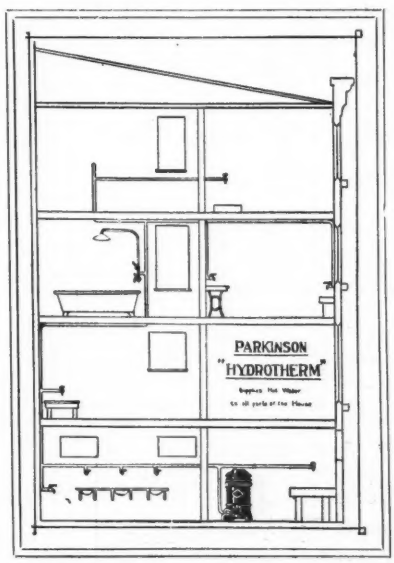
NO PERMANENT CONSUMPTION

EXCEPT SMALL PILOT JET.

Lists and Full Particulars from

THE PARKINSON STOVE CO., LD.

BIRMINGHAM & LONDON.



Wanganui (N.Z.) Gas Supply.

According to reports contained in local papers just to hand, the working of the gas undertaking of the Wanganui Borough Council in the twelve months ended the 31st of March was very satisfactory. The Chairman of the Gas Committee (Mr. A. S. Burgess) reported that the gross profits amounted to £7269. After allowing £2811 for interest on loans, there was left a net profit of £4458. Deducting £1378 for the sinking fund, a balance of £3080 remained. This, he said, was the highest since the works had been taken over by the Council; and it was especially satisfactory when it was considered that £2499 had been spent on the repair and maintenance of plant. The total amount handed over from the profits in relief of the rates to the end of the last financial year was £13,900. In the latter part of this period, there was a substantial reduction in the price of gas used for power. Mr. Burgess concluded by comparing the undertaking under his supervision with that at Napier, which is in the hands of a Company. He said the profit last year at Napier, on a capital of £73,785, was £5646, or equal to 7·65 per cent., against £7269, on a capital of £66,000, or 11 per cent., at Wanganui. He thought these figures were instructive, as the two works were nearly similar in size. In the course of his annual report, the Gas Engineer and Manager (Mr. G. D. Stone) expressed his great pleasure in stating that the profit earned during the past financial year had been a record; while on the other hand, the expenditure on new works, repairs and maintenance, mains, and services had been exceedingly high, amounting to £3305, against £1326 for the previous year. Having to meet so large an expenditure out of the profits had reduced the surplus cash to £1631 During the year, there had been used 5829 tons of coal, or 123 tons more than before—giving an increased yield of nearly 7 million cubic feet of gas. The cash takings for sales of gas by meter had increased by £1621. When compared with the year ended March 31, 1909, the results were far more marked. They showed that a few tons of coal less had been used with an increased make of upwards of 12 million cubic feet of gas; while the cash takings for the sales by meter had increased by £2820. The gas sold by meter per ton of coal carbonized was 9743 cubic feet in 1905; whereas in the past year it was 11,930 cubic feet – an increase of 2196 cubic feet. The actual increase in the gas made and accounted for in this period was 2200 cubic feet. Compared with the year 1909-10, the output of gas was greater last year by 8¾ per cent.; and there was an increase of 288 in the number of services connected.

The Richmond Gas Stove and Meter Company, Limited, have declared an interim dividend at the rate of 10 per cent. per annum.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending June 24. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar, crude	per ton	—	18/6 21/–	19/– 22/6	18/6 21/–	18/9 21/6	—
Pitch	,,	39/–	36/6	37/–	36/6	36/–	36/–
Benzol, 90%	per gallon	–/10½	–/9	–/9	–/9¼	–/9	–/9¼
Benzol, 50-90%	,,	—	–/9⅜	–/9½	–/8¼	–/8⅜	—
Toluol, 90%	,,	–/10¼	–/9½	–/10	–/10	–/10	–/10
Crude naphtha, 30%	,,	—	–/3¾	–/4	–/3¼ –/3½	–/3½	—
Light oil, 50%	,,	—	–/3½	–/3⅜ –/4	–/3⅜	–/3⅜	—
Solvent naphtha, 90-160	,,	—	–/10	–/10	–/10	–/10 –/10½	–/11
Heavy naphtha, 90-190	,,	—	–/11	–/11½	–/11¼	–/11¼	–/11
Creosote in bulk	,,	–/2½	–/2⅜	–/2	–/2⅛	–/2 3/16	–/1⅞
Heavy oils	,,	—	–/2⅜ –/2⅝	–/2¼	–/2⅜	–/2¼	–/2⅜
Carbolic Acid, 60's	,,	—	1/9½	1/10	1/7	1/7½	1/9½
Naphthalene, crude drained salts	per ton	—	43/9	40/– 42/6	47/6	47/6 50/–	—
,, pressed	,,	—	60/–	63/–	60/–	60/– 72/6	—
,, whizzed	,,	—	—	—	70/– 72/6	60/– 75/–	60/–
Anthracene	per unit	–/2	–/1¼	–/1½	–/1¼	–/1¼	—

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situation Vacant.

DRAUGHTSMAN. Robert Dempster and Sons, Elland.

Situation Wanted.

METER INSPECTOR AND COLLECTOR. &c. No. 5419.

Plant, &c. (Second-Hand), For Sale.

PURIFIERS. Robert Dempster and Sons, Elland.
RETORT MOUTHPIECES, PIPES, VALVES, &c., AND STEAM ENGINE. Smethwick Gas-Works.

Stocks and Shares.

BRIGHTON AND HOVE GAS COMPANY. By Auction. July 4.
EAST GRINSTEAD GAS AND WATER COMPANY. July 11.
GRAVESEND AND MILTON WATER COMPANY. July 11.
NORTH MIDDLESEX GAS COMPANY. By Auction. July 4.
REDHILL GAS COMPANY. July 11.
SOUTHEND WATER COMPANY. July 11.
SOUTHGATE GAS COMPANY. By Auction. July 4.
SUTTON GAS COMPANY. July 11.

TENDERS FOR

Coal and Cannel.

LIMERICK GAS DEPARTMENT. Tenders by July 3.
OLDBURY GAS DEPARTMENT. Tenders by July 11.
PENRITH GAS DEPARTMENT. Tenders by July 4.
TEIGNMOUTH GAS DEPARTMENT. Tenders by July 3.

Tar and Liquor.

EAST RETFORD GAS DEPARTMENT. Tenders by June 30.
NEWARK GAS COMPANY. Tenders by July 7.
PENRITH GAS DEPARTMENT. Tenders by July 4.

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O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
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Telegraphic Address: "Carburine, London."

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SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
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WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CXIV. No. 2511.] LONDON, JUNE 27, 1911. [63RD YEAR. PRICE 6d.

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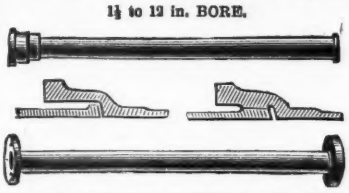
1¼ to 12 in. BORE.



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Charges 8 to 10 Tons each.
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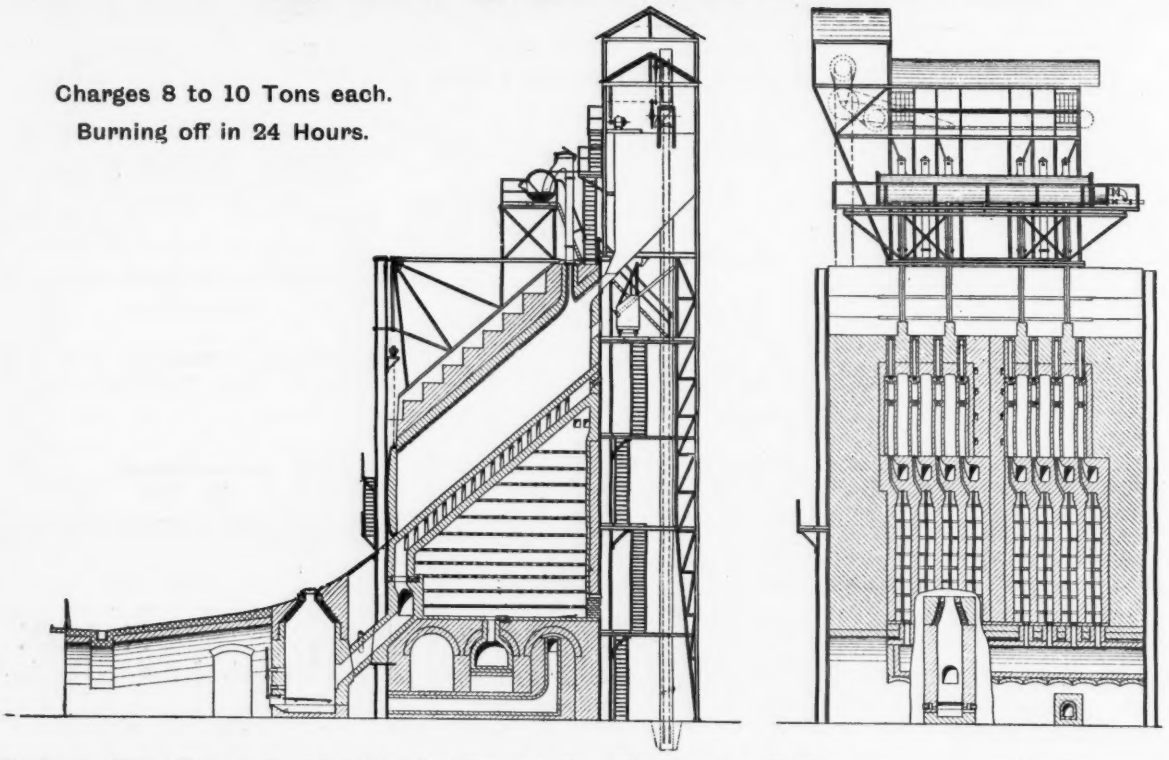

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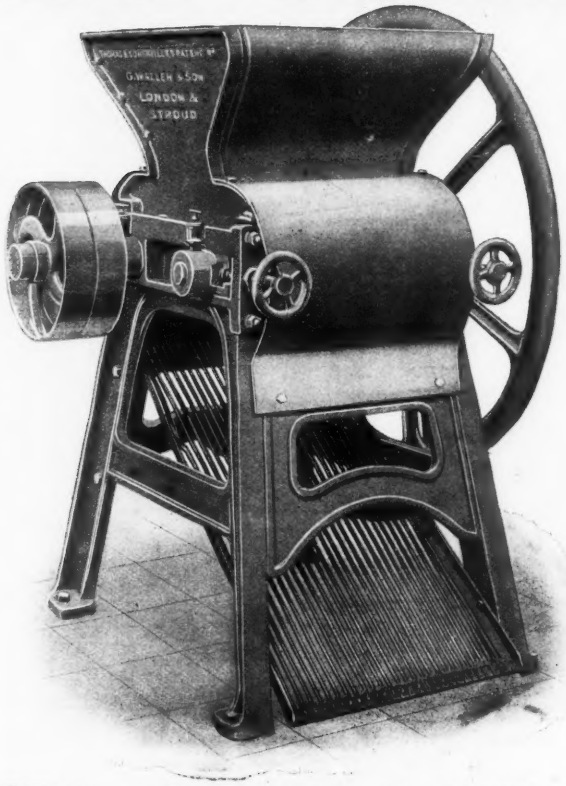

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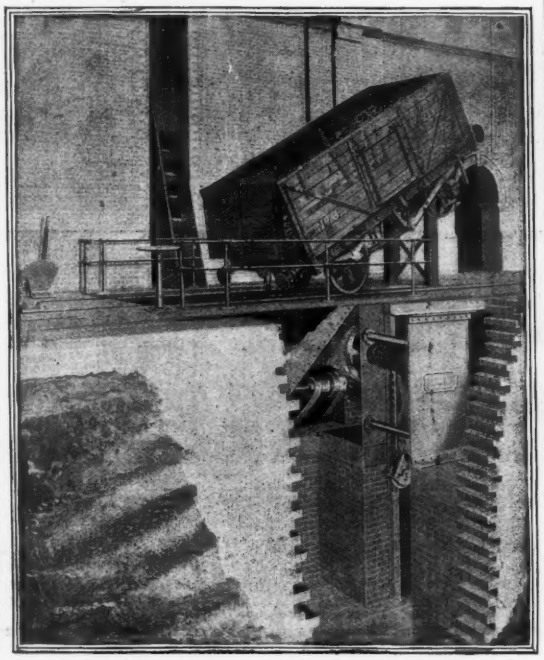

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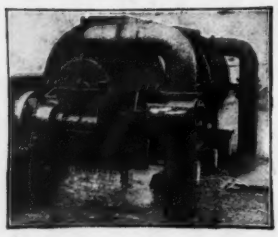

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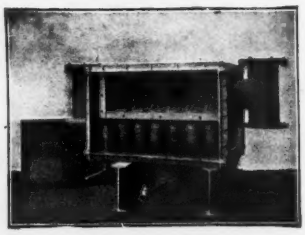

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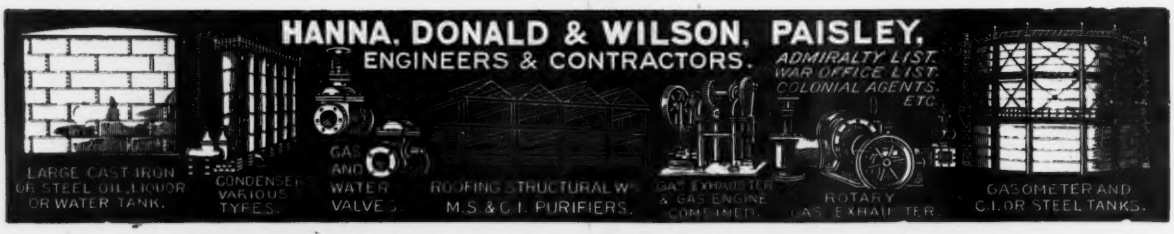
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Every Skein of equal weight and length.
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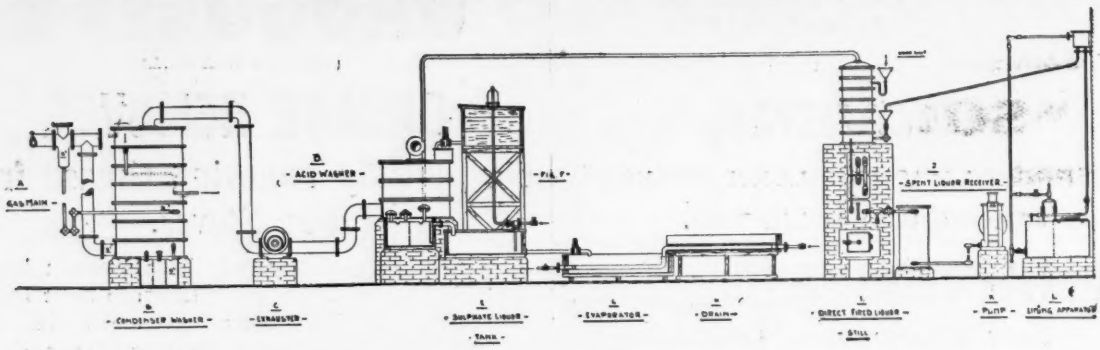
WILTON'S SULPHATE OF AMMONIA PLANT



General View of Plant from Outlet of Hydraulic Main to Inlet of Purifiers for Cooling, Removing Tar, Tar Fog, Naphthalene, and Ammonia as Sulphate.

NO WASTE LIQUORS. **NO DEVIL LIQUOR.**

NO LOSS OF AMMONIA. **FINE WHITE SALT.**

WATER WASHING DISPENSED WITH. **LESS LABOUR.**

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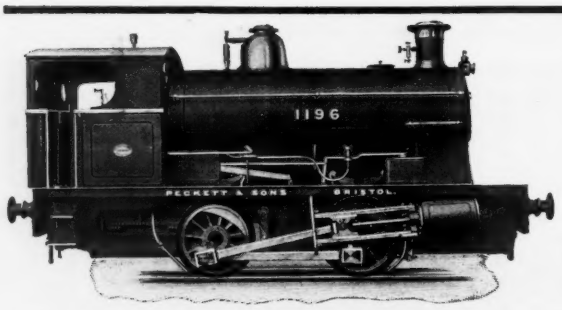

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TOWNS.	No. of Settings.	Coal Capacity per 24 hours.	No. of Chambers.
Munich, Kierchstein	5	48·5 Tons	15
Munich, Moosach (1st Order)	6	117 ,,	18
Munich ,, (2nd Order)	6	117 ,,	18
Hamburg (1st Order)	10	195 ,,	30
Hamburg (2nd Order)	14	310 ,,	42
Berlin, Tegel	27	526 ,,	81
Paris, Genevilliers	20	272 ,,	60
Paris, La Villette	32	480 ,,	96

TOWNS.	No. of Settings.	Coal Capacity per 24 hours.	No. of Chambers.
Rome (1st order)	20	350 Tons	60
Rome (2nd order)	12	216 ,,	36
Leipsig (1st order)	8	156 ,,	24
Leipsig (2nd order)	8	156 ,,	24
Hanau	8	110 ,,	24
Regensburg	5	87 ,,	15
		3140·5	**TONS OF COAL PER DAY.**

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THE COKE OVENS AND BY-PRODUCTS CO., LD.,

ST. STEPHENS HOUSE, WESTMINSTER, S.W.

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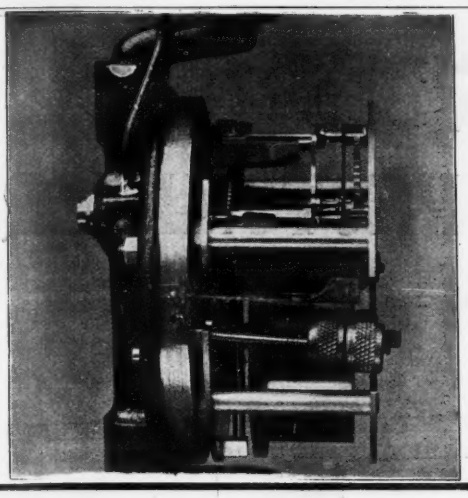

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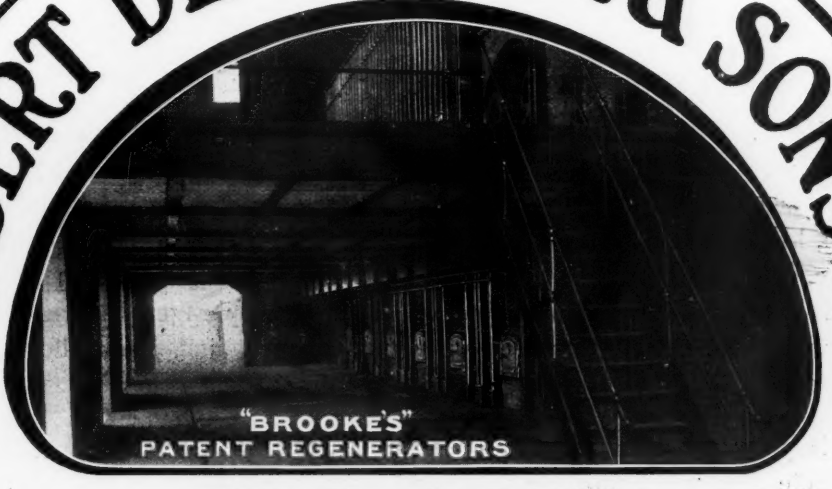

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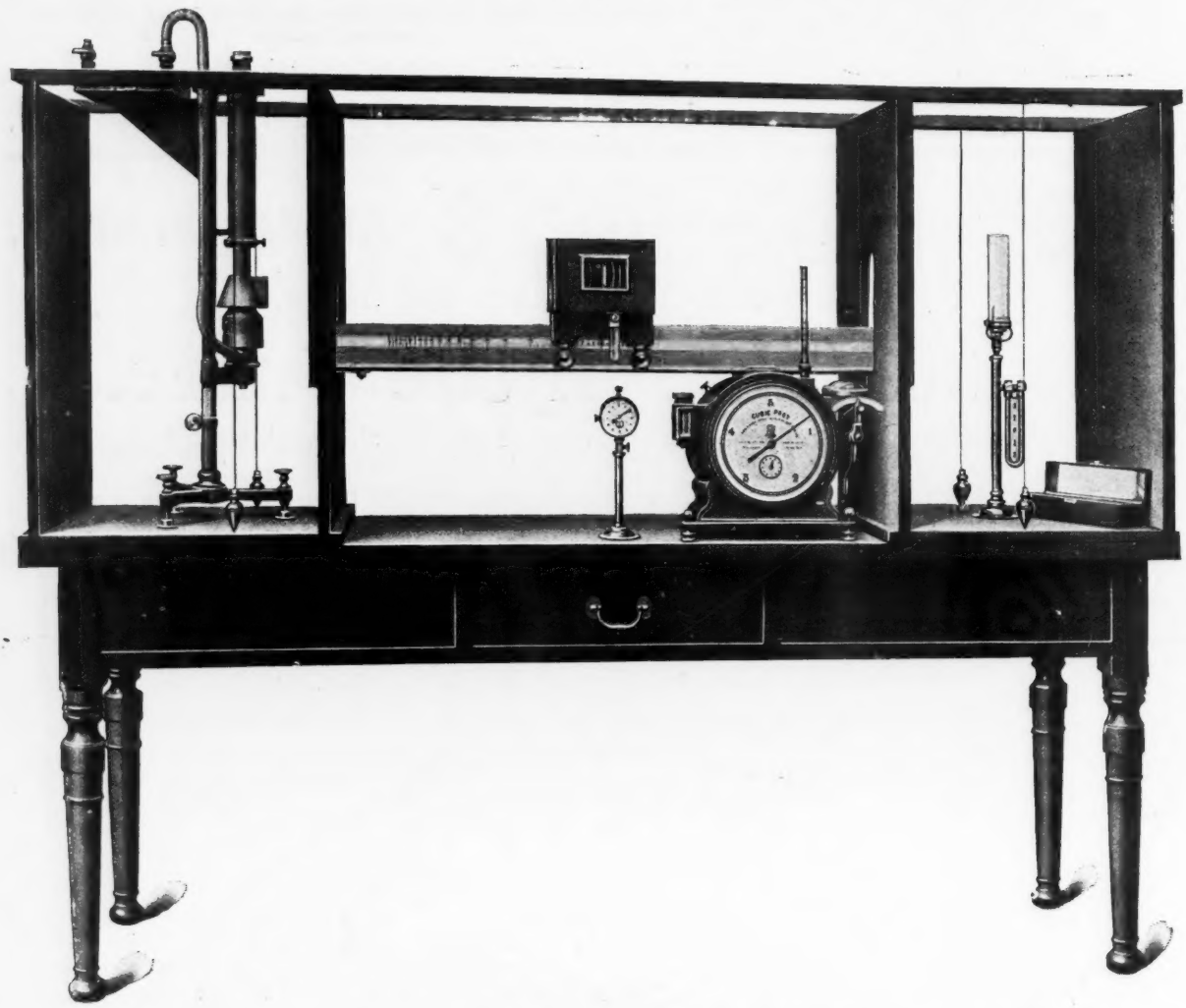

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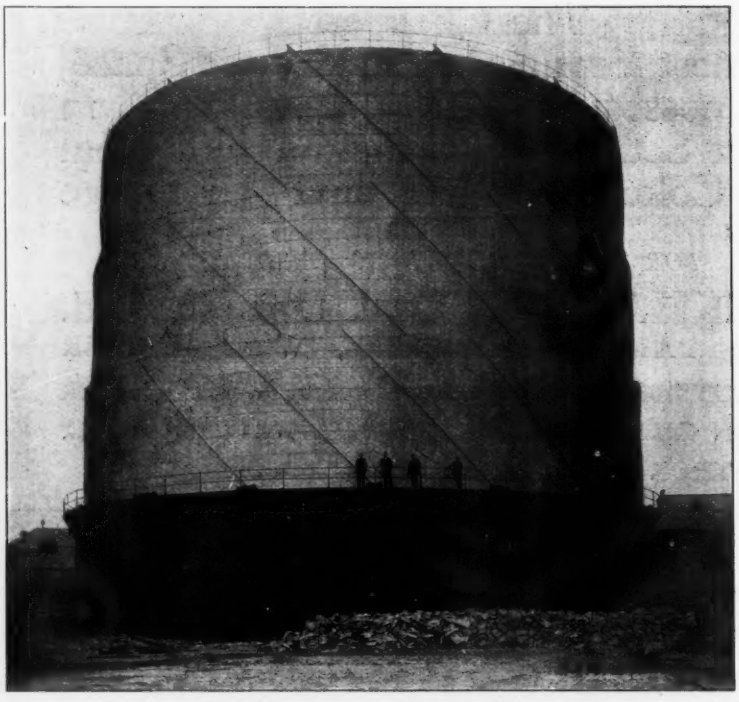

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TAR.

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Terms, cash Monthly.
Tenders, marked on the outside "Tenders for Tar," to be sent in to the undersigned on or before July 7, 1911.
The Directors do not bind themselves to accept the highest or any Tender.

F. B. FOOTTIT.
June 21, 1911. Secretary,

CITY OF LIMERICK.

TENDERS FOR GAS COAL.

THE Gas Committee invite Tenders for the Supply of Best Screened GAS COAL for a period of Twelve Months from date of Contract.
Full Particulars and Form of Tender can be obtained from the Engineer and Manager, Mr. H. Hawkins, Gas Works, Limerick.
Sealed Tenders, endorsed "Gas Coal," to be sent in, addressed to the Chairman, Gas Committee, Gas Offices, William Street, Limerick, on or before Five p.m., July 3, 1911.
The Committee do not bind themselves to accept the lowest or any Tender.

By order.
H. HAWKINS,
Engineer and Manager.
Gas-Works, Dock Road, Limerick, June 20, 1911.

PENRITH URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL AND TAR.

THE Gas Committee of the above Council are prepared to receive TENDERS for the Supply of COAL and CANNEL for the Year ending June 30, 1912; also for the PURCHASE of the Surplus TAR produced at their Works during the same period.
Endorsed Tenders, for Coal or Tar, to be Delivered to Mr. Wainwright, Town Hall, Penrith, not later than July 4, 1911.
Further Particulars and Forms of Tender may be had on Application to

E. SHAUL,
Gas-Works, Penrith, Manager.
June 23, 1911.

URBAN DISTRICT COUNCIL OF OLDBURY.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council are prepared to receive TENDERS for the Supply of 12,000 Tons of Best Screened GAS COAL for Delivery during the Year ending July 31, 1912.
Further Particulars and Tender Forms may be obtained on Application to the undersigned.
Sealed Tenders, endorsed "Tender for Gas Coal," addressed to the Chairman of the Gas Committee, to be delivered to the undersigned not later than Friday, the 14th day of July, 1911.
The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Contract as they may think fit.

By order,
A. COOKE,
Gas-Works, Oldbury, General Manager.
June 24, 1911.

TEIGNMOUTH URBAN DISTRICT COUNCIL.

THE Gas Department of the above Council invite TENDERS for the Supply of 4000 Tons of Best Durham or other good GAS COAL, (Screened or Unscreened). The same to be supplied to the requirements of the Council between the 31st day of July, 1911, and the 30th day of June, 1912.

The Coal must be Fresh Wrought and free from all Impurities.

No Special Tender Form will be issued.

Tenders must be accompanied by a full Description and Practical Working Analysis of the Coals quoted, and may be either f.o.b. at port of shipment, Teignmouth Harbour, f.o.r. Teignmouth Railway Station, or delivered into the Gas-Works Store.

Seaborne Coals must be carried in Sailing Vessels only.

Sealed Tenders, endorsed "Gas Coals," to be addressed to A. Percival Dell, Esq., Clerk to the Council, Town Hall, Teignmouth, and delivered not later than Monday, the 3rd day of July, 1911.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
J. ALEX. GRAY,
Gas Manager.

Gas-Works, Teignmouth,
June 15, 1911.

BOROUGH OF EAST RETFORD.

THE Gas Committee of the above Corporation invite TENDERS for the Purchase of the AMMONIACAL LIQUOR produced at the Works during the Year ending June 30, 1912.

Tenders to be sent in, addressed to the Chairman of the Gas Committee, endorsed "Tender for Liquor," on or before the 30th inst.

Further Particulars may be obtained from the undersigned.

J. B. FENWICK,
Engineer and Manager.

Gas and Water Office, Retford,
June 19, 1911.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks or Shares in these Periodical Sales, will be forwarded on application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of Trustees.

GAS STOCKS AND SHARES
OF THE
CAPITAL VALUE OF UPWARDS OF £17,000.
IN THE
BRIGHTON AND HOVE GENERAL GAS COMPANY
SOUTHGATE AND DISTRICT GAS COMPANY,
NORTH MIDDLESEX GAS COMPANY.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 4, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK,
AND
500 £10 NEW ORDINARY FIVE PER CENT. MAXIMUM SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 11, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GRAVESEND AND MILTON WATER-WORKS COMPANY.

NEW ISSUE OF 500 £20 FOUR-AND-A-HALF PER CENT. PREFERENCE SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 11, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, as above.

By order of the Directors of the
SUTTON GAS COMPANY.

NEW ISSUE OF £6500 FOUR-AND-A-HALF PER CENT. MORTGAGE DEBENTURES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 11, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, as above.

By order of the Executors of the late W. V. K. Stenning, Esq., and another Owner.

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52 £10 "A" SHARES AND £316 "A" STOCK,
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AND
£100 ORDINARY "B" STOCK.

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THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate TO CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m., on Tuesday, the 4th day of July next, and WILL BE RE-OPENED immediately after the HALF-YEARLY ORDINARY GENERAL MEETING of the Company to be held on Friday, the 4th day of August next.

By order,
HENRY RAYNER,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W., June 21, 1911.

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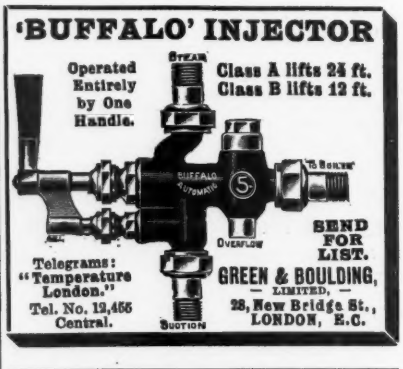

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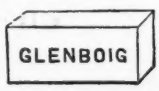

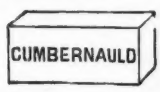

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Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, LEADENHALL STREET,
LONDON, E.C., September 21st, 1909.

DEAR SIRS,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·16
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70%
,, ,, ,, 1050° C.	4·76%
,, ,, Total	8·46%
Volume shrinkage at 100° C.	10·7 %
,, ,, ,, 1050° C.	12·6 %
,, ,, Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. 3362° F. (SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

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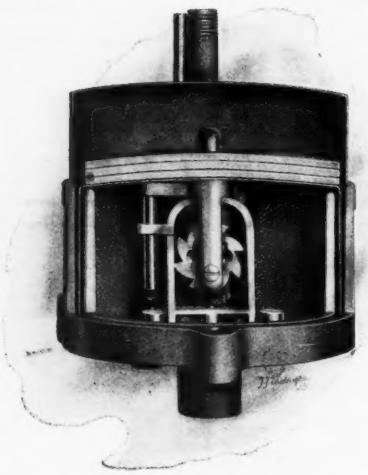

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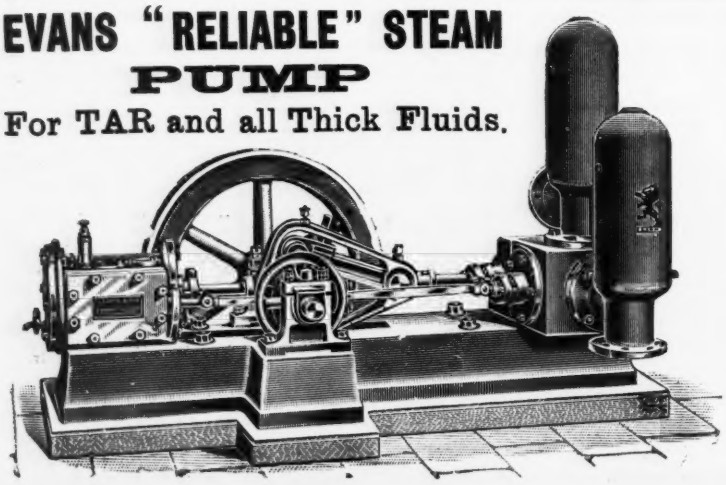

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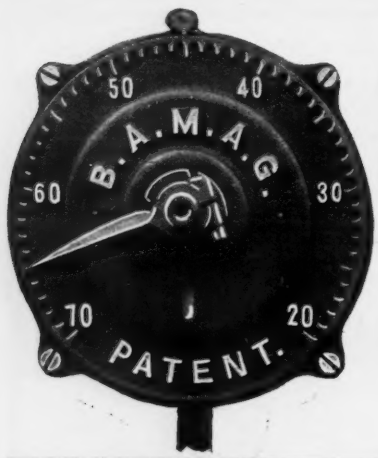

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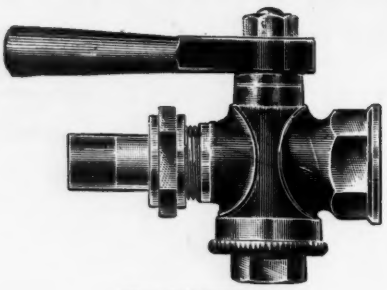

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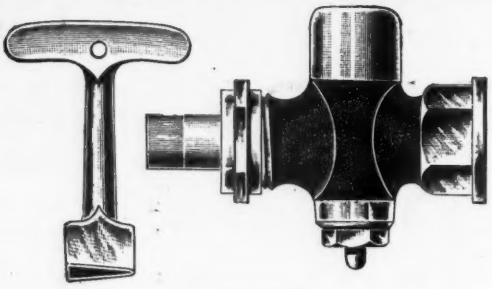

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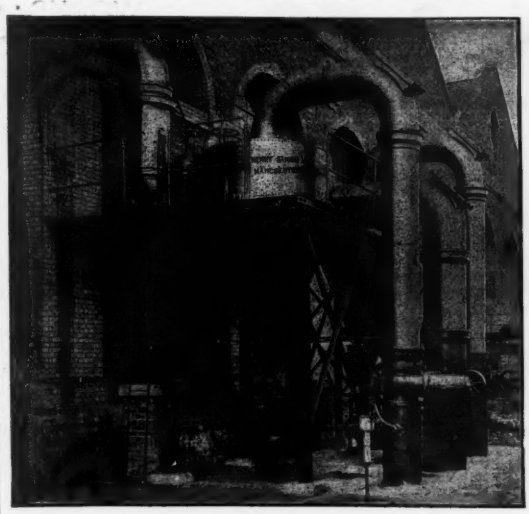

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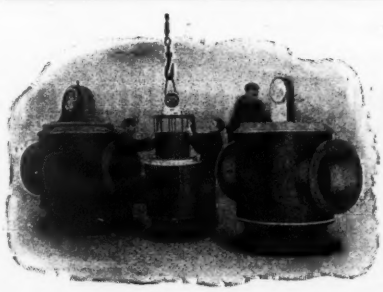

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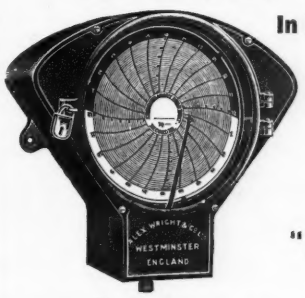

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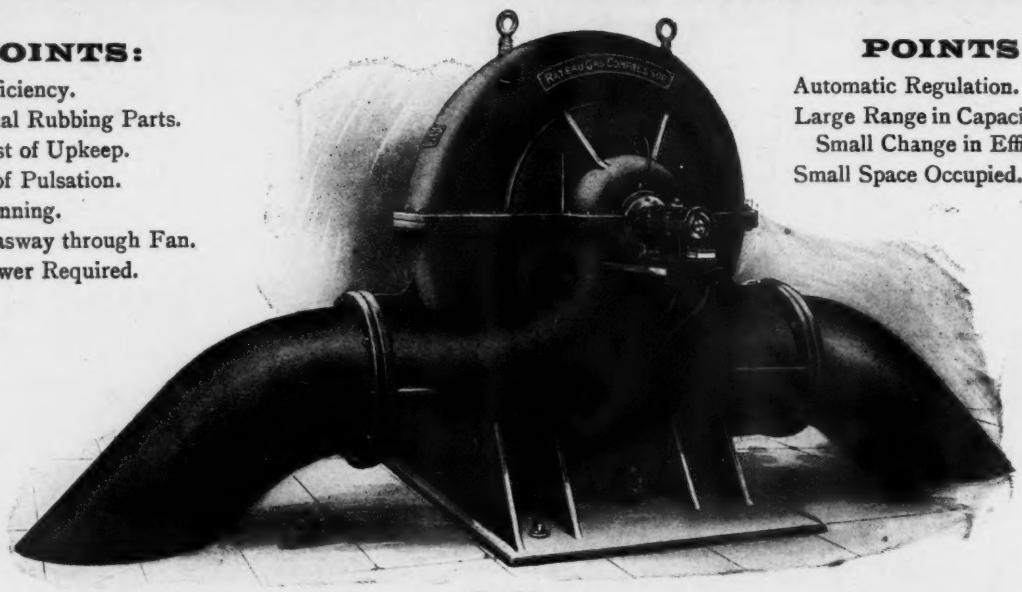

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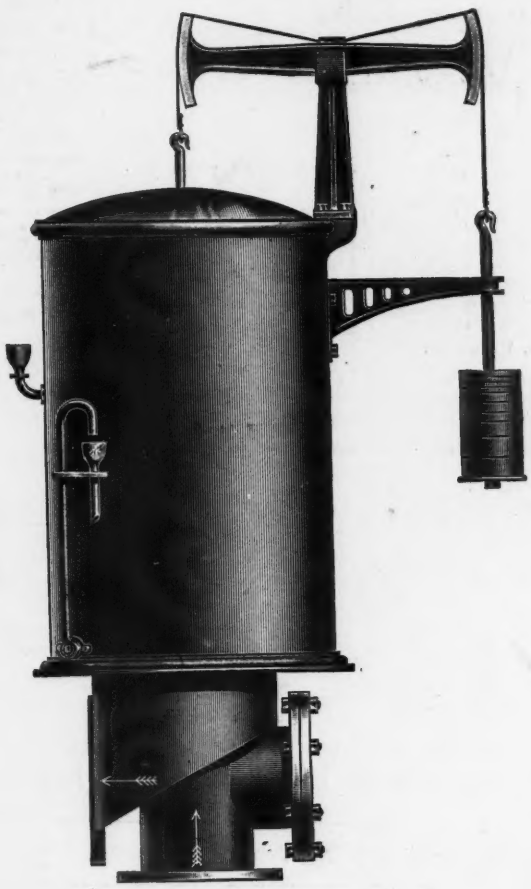

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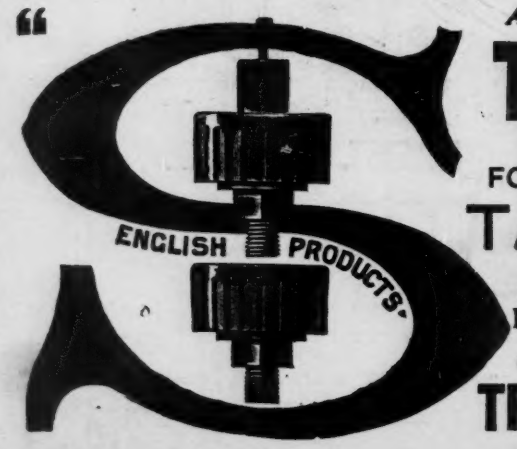

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